WORLD OIL

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for the drilling-producing-pipe line industry

PETROLEUM REFINER and The REFINERY CATALOG
for the refining-natural gasoline industry

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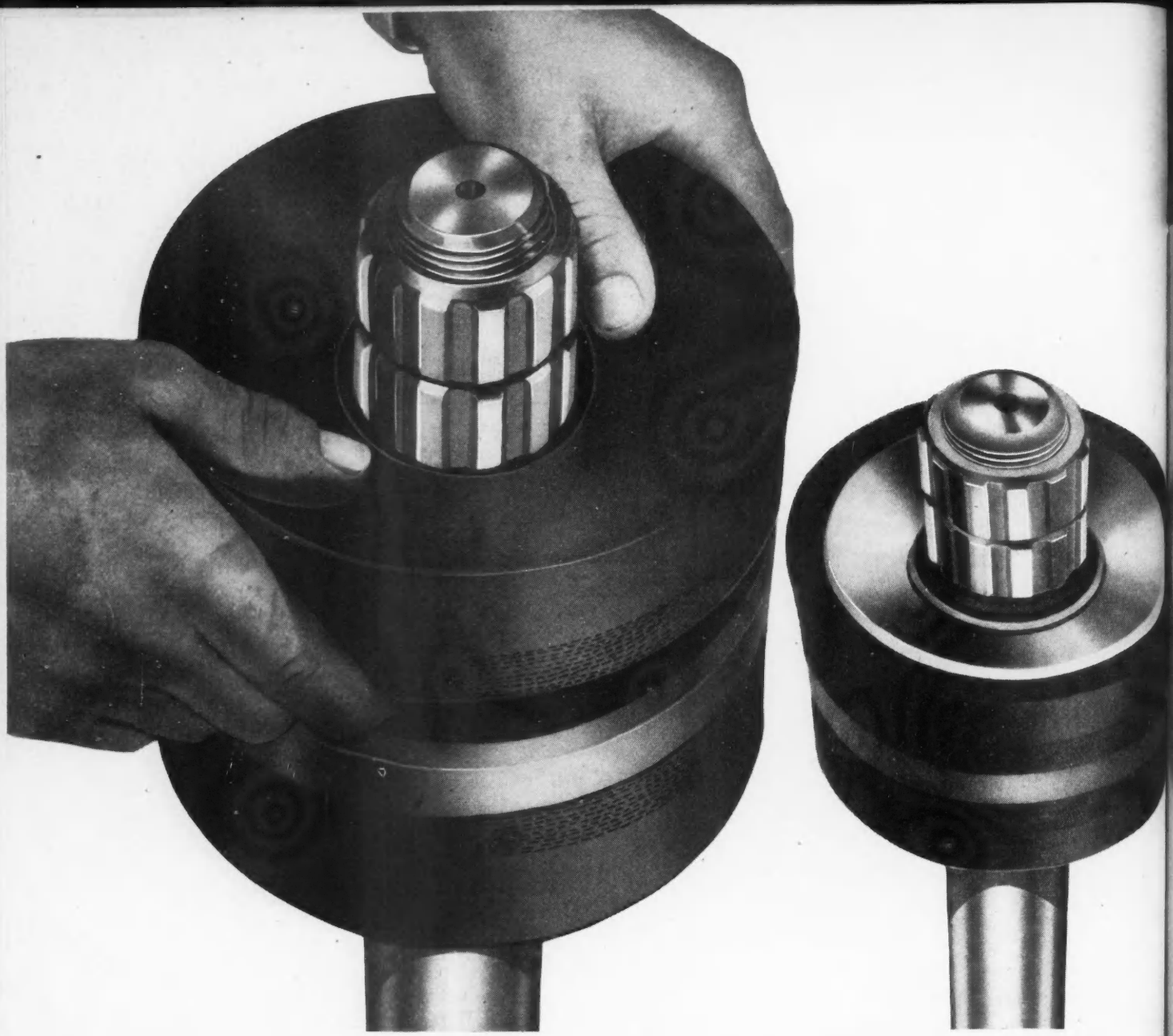

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THE OUTLOOK

CHARLES RAYNER, petroleum adviser to the State Department, will resign that position soon. Rayner assumed his present position in 1944, succeeding Max W. Thornburg, first oil adviser the department ever had. Rayner has been particularly concerned with the Anglo-American oil treaty, now shelved in the Senate's Foreign Affairs committee

DEVELOPMENT of Canada's new Leduc field in southeastern Alberta may result in fundamental changes in the entire oil production and distribution picture of the North American continent. Reserves already are indicated sufficient to supply Canada's Far Western provinces together with Oregon and Washington and the Great Lakes area of both countries.

THE STEEL SHORTAGE is leading to new techniques in the fabrication of aluminum and magnesium, the effects of which will be felt in every industry which in the past has been dependent upon steel and copper. Aluminum already is overtaking copper as the leading non-ferrous metal, and magnesium is destined to be the basis of a substantial industry because of the ease with which it can be worked and its excellent heat conductivity.

A HOUSE SUBCOMMITTEE shortly will engage in an investigation of the competition offered private business by Government-owned corporations, going into the operations of such agencies as the Rubber Development Corporation, Inland Waterways Corporation and Export-Import Bank of Washington.

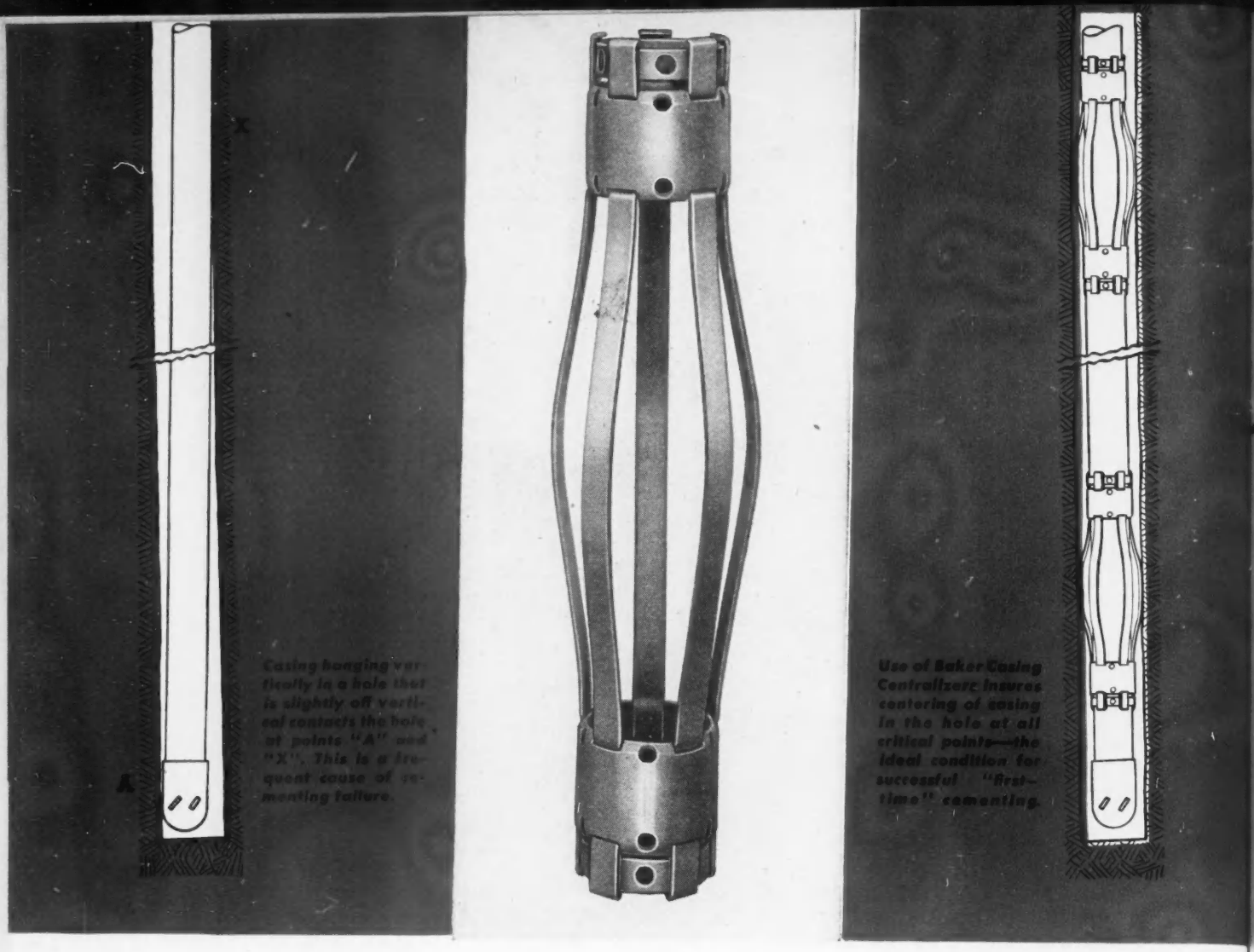
BARRING QUICK ACTION by Congress or the Supreme Court to overturn the decision in the California tidelands case, the Administration this winter will ask for legislation placing the developed portion of the area, at least, under the Mineral Leasing Act. A very considerable number of applications for leases on the underwater lands already has been received by the Interior Department, and returned with the explanation there now is no authority to make leases.

CONTOUR GAUGING developed for engine cylinder service, as distinct from calipering, is expected to assist determination of scope of drill joint wear, and thus to eliminate eccentric loading.

CHARTER for the proposed International Trade Organization, adopted recently at Geneva, will be tied in with our whole reciprocal trade program when it comes before Congress next year for ratification. Greatest objection to the charter is that it is so full of exceptions that its force toward the demolition of artificial trade barriers will be negligible.

PRESSURE on the Brazilian government from Communist groups may have the effect of delaying passage of the law designed to open that country to American and other oil men. In a recent attack upon the government, Communists charged that officials want to give Brazilian oil resources to the Standard Oil Company "as a gift."

A NEW RADIO SYSTEM capable of detecting minute movement of a small transmitter which serves as target is being investigated with a view to using it in surveying distances greater than line-of-sight systems can encompass. It is expected to prove of value in fixing geological and geophysical boundaries in preliminary surveys.


X
A
Casing hanging vertically in a hole that is slightly off vertical contacts the hole at points "A" and "X". This is a frequent cause of cementing failure.
Use of Baker Casing Centralizers insures centering of casing in the hole at all critical points—the ideal condition for successful "first-time" cementing.

IT PAYS TO CENTER CASING

When casing is off-center and leaning against the side of the hole at the shoe joint (left view above) the hazard of channeling is obvious. It is also easy to see why so many cementing jobs are failures because it is impossible to place a uniform body of cement ALL AROUND the casing at the vital shoe joint when the casing is not centered. So long as this condition exists, there are sure to be failures to secure good water shut-offs as well as other cementing failures.

Now let's study the drawing at right which illustrates how Baker Casing Centralizers (Product No. 910) provide a uniform annulus for placement of cement entirely around the casing at critical cementing points, and minimize the danger of channeling. Baker Casing Centralizers are simple and effective; they are easy to install and use; they are inexpensive and can be secured promptly through your nearest Baker office or representative.

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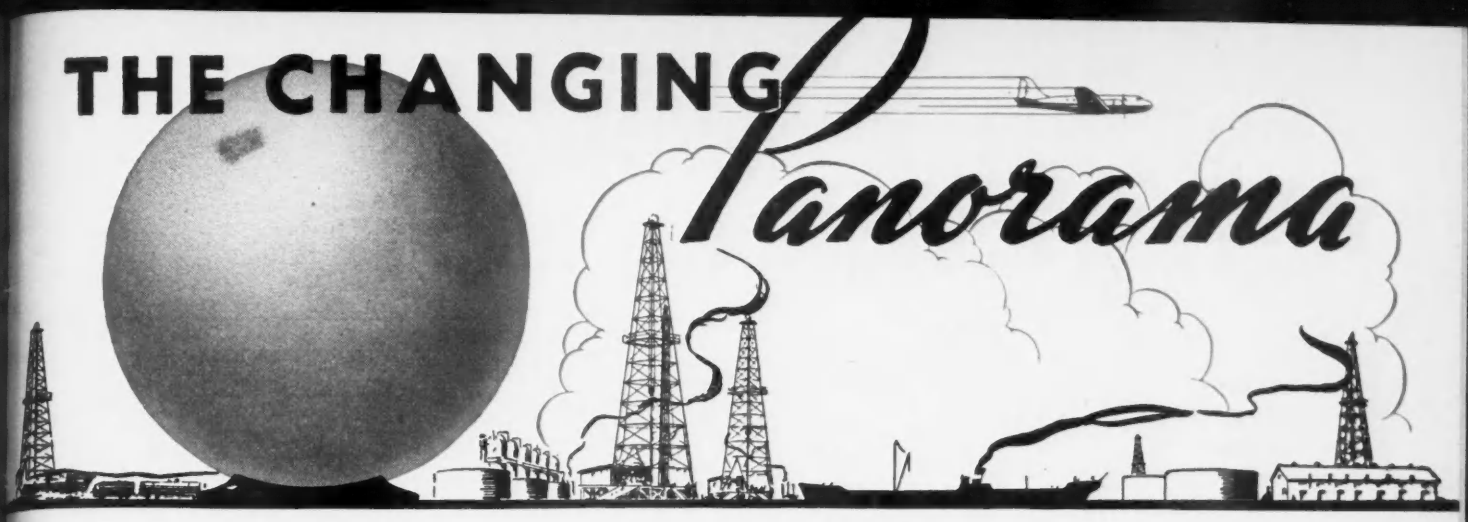
It's Time to Center YOUR Casing!

If you would like a copy of the New BAKER Casing Centralizer Broadcast, which describes and illustrates many important applications, address Baker Oil Tools, Inc., Box 127, Vernon Station, Los Angeles 11, California.

THE CHANGING Panorama



The Steel Industry IS Doing A Good Job

CRITICISM of the steel industry for not increasing its capacity is hardly in line with actual facts. Under way is a record-breaking peacetime expansion program totaling more than $1 billion, which will enlarge ingot-making capacity by 2½ million tons during 1947 and 1948. In addition, nearly 3 million tons of new coke oven facilities, 3 million tons of new blast furnace capacity, and 3 million tons of new sheet and strip capacity also are under construction.

This extensive program, together with record-breaking peacetime production this year, is the best answer to statements that steel companies are purposely holding back on expansion to maintain a situation where demand would stay ahead of output.

Although the steel industry faces abnormal demand, complaints about shortages would be relatively few if output had not been reduced by 10 percent, or 18 million ingot tons, because of labor strikes since the end of the war.

A factor which enters into the picture is the large amount of steel required to build additional capacity, an amount equal to the output of new facilities for a full year being needed. Too rapid an expansion of steel capacities would require very large quantities of steel, thus at least temporarily depriving other industries of volumes now available.

Pipe For Sale!

WHEN Dick Lewis of Jones & Laughlin Steel Corporation, Continental Building, Houston, was asked by a WORLD OIL man a day or so ago about the pipe situation, Dick grinned and said: "I have some news for you. We have on hand in Houston 600 feet of five-inch, 11½-pound pipe we'd like to sell!"

All right, boys, Dick's phone number is Capitol 0331.

A large group of business men, bankers, editors of business pages in newspapers and business paper editors were asked by the magazine "American Business" to name the best-managed company in their locality or industry. Four oil companies appeared in the list of 209 companies . . . Humble Oil & Refining Company, Signal Oil Company, Standard Oil Company (Indiana) and Union Oil Company of California.

Communism and Oil Won't Mix In U. S.

IN VIEW of the feeling on the part of many that the Oil Workers Union (CIO) has Communists in its rank and file, if not among the officials of some of its locals, the action of the union in refusing to make affidavit that none of its officials are Communists leaves a distinctly bad taste. It is one thing to be a union—quite another to act as a cover for Communists, and whether or not there are Communists among the union officials, the union's action will leave a suspicion in the minds of many that Communist influence is at work.

The further fact that the union was trying to force an oil company to bargain with it, while refusing to clear its skirts of Communist taint, by failing to do something required by law, is simply an indication of something we have long known, that the CIO has difficulty in thriving under conditions of mutual interest between it and the employing company with which it may be dealing.

We do not mean to assume, of course, that all members, or even a substantial percentage of the members of the Oil Workers Union are Communists. We feel sure that they are not. We have even heard that some of the top officials have been working very hard to drive Communists from positions of importance in the union. On the other hand we feel equally sure in our own mind that such oil workers as are Communists have identified themselves with the union; and the action leading to a federal court decision that the union must certify that none of its officials are Communists, if it is to act as a bargaining agency, may mean that the non-Communist leaders are not as sure of themselves as they ought to be.

The time may not be far off when association with the Communist party will carry the same kind of stigma which membership in the German American Bund carried. Perhaps that time has already arrived.

Oil workers owe it to themselves to be careful that they are not used to further the aims of a group whose interests lie over the ocean and not here—interests which would destroy the U. S. or make it a satellite of Russia.

Synthetic Rubber Is Going On Its Own

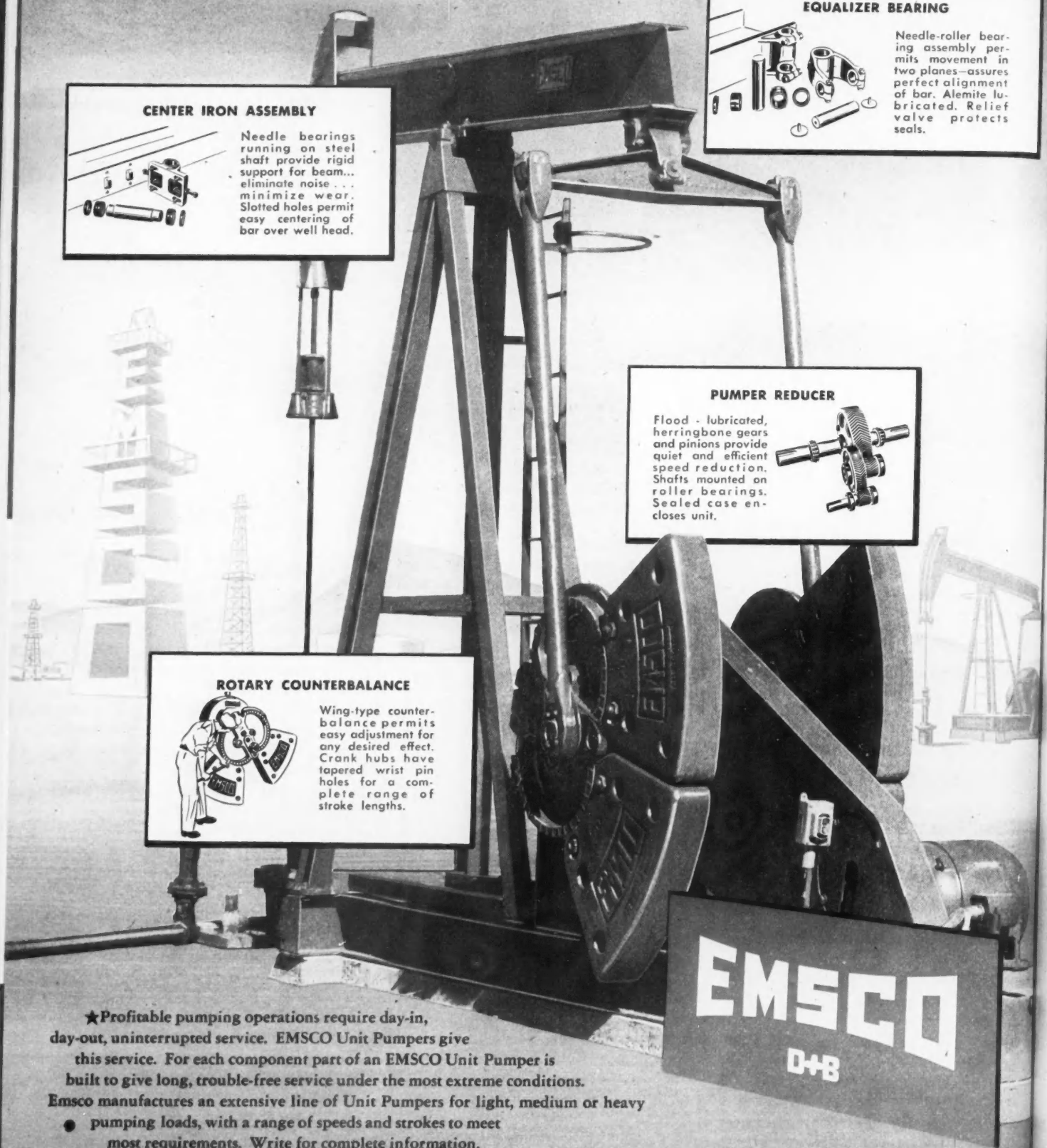
THE next 12 months will be very important to the war-born U. S. synthetic rubber industry. During this time, its status as a peacetime business will be largely determined.

Due to expire next March 31 is a law requiring manufacturers to mix synthetic rubber in their products. A House of Representatives committee is expected to have such a bill ready by the time Congress reconvenes in January.

Meanwhile, this worn-born industry could be given a big boost in its competition with natural rubber if the government agrees to cancel the 1941 agreement calling for the pooling of research developments and "know-how" techniques. Companies now are making their second attempt to gain government consent to discard the pooling pact.

Technological advances are being retarded because companies are reluctant to pour their full resources into research as long as they must share them with rivals. If the companies were permitted to gain competitive advantage from their research, the development of new products and processes unquestionably would be speeded up.

The "Inside Job" on an
EMSCO UNIT PUMPER



EQUALIZER BEARING

Needle-roller bearing assembly permits movement in two planes—assures perfect alignment of bar. Alemite lubricated. Relief valve protects seals.

CENTER IRON ASSEMBLY

Needle bearings running on steel shaft provide rigid support for beam... eliminate noise . . . minimize wear. Slotted holes permit easy centering of bar over well head.

PUMPER REDUCER

Flood - lubricated, herringbone gears and pinions provide quiet and efficient speed reduction. Shafts mounted on roller bearings. Sealed case encloses unit.

ROTARY COUNTERBALANCE

Wing-type counterbalance permits easy adjustment for any desired effect. Crank hubs have tapered wrist pin holes for a complete range of stroke lengths.

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★Profitable pumping operations require day-in, day-out, uninterrupted service. EMSCO Unit Pumpers give this service. For each component part of an EMSCO Unit Pumper is built to give long, trouble-free service under the most extreme conditions. Emsco manufactures an extensive line of Unit Pumpers for light, medium or heavy pumping loads, with a range of speeds and strokes to meet most requirements. Write for complete information.

EMSCO Unit Pumpers are available for either standard Mid-Continent settings or for California floor-clearing installations. Illustration shows typical California unit.

"PACEMAKERS IN OIL FIELD EQUIPMENT DESI

EMSCO DERRICK & EQUIPMENT COMPANY
Houston Los Angeles Dallas

THE WEEK'S NEWS

Texas Tidelands Leases to be Sold; Federal Claims to Bring No Discount

The Texas School Land Board voted unanimously last week to proceed with the November 4 sale of Gulf tidelands leases. They decided to advertise a record 2,465,324 acres—662 tracts containing 1,989,840 acres in the Gulf, and 51 tracts of 19,934 acres of upland, and 1141 tracts consisting of 455,550 acres in bays, inlets and river beds. Tideland areas extend from High Island on the east to Port O'Connor on the west.

Board members—Governor Jester, Attorney General Daniel, and Land Commissioner Giles—said they decided to proceed with the sale because of two reasons:

1. "Our firm belief that the State of Texas . . . has complete legal title to and ownership of those submerged lands."

2. "Because a number of independent operators and smaller companies have indicated the same faith and an urgent desire to begin development of the property. They propose to make no discount on their bids due to recent claims of the federal government, and we will refuse to consider bids which average less than the average prices received on former sales of submerged leases."

Board members said they had carefully considered the fact that larger operators have not requested that acreage be offered and might not bid on that advertised.

"This failure to participate will decrease the total sales on November 4 by at least one-half, resulting in a loss of more than $2 million in lease sales, based upon former experience and average prices, and will delay development of a great portion of the acreage," they said.

Giles in a comment at the meeting said that if land doesn't bring what it should, the Board will not sell.

Houston-New Orleans Airline To Venezuela Is Authorized

Nomads have been advised that the Civil Aeronautics Board has authorized Chicago and Southern Air Lines, Inc., to operate a passenger line to Caracas, Venezuela, from the co-terminals, New Orleans and Houston. Various intermediate points in the Caribbean area will be included on the route. Chicago and Southern has not yet inaugurated service beyond Havana, CAB has advised, but CAB states that the authorization will provide direct service between Houston and Caracas.

Pan American Airways has asked for a permit to operate a direct line between Houston and Caracas and CAB has scheduled a hearing October 20 on the matter.

The Houston Chapter Nomads asked other chapters and oil men interested in better connections from the Southwestern part of the United States to Venezuela to communicate with CAB on the Pan American application.

☆ ☆ ☆

700 Requests for Tidelands Oil and Gas Leases Rejected

More than 700 applications for leases of oil and gas lands off the California coast and in the Gulf of Mexico have been rejected by the Bureau of Land Management since the Supreme Court held the federal government to be owner of the California tidelands.

Rejection was based on the ground that the provisions of the Mineral Leasing Act of 1920 have been held inapplicable to the underwater lands. No steps to make leases can be taken, according to Interior Secretary J. A. Krug, unless Congress enacts new legislation setting the policies and procedures to be followed in the submerged areas.

Of the lease applications filed, department records show, 255 involve the California tidelands covered by the Government's suit. The remaining 255 applications refer to areas in the Gulf Coast region, and were filed as a result of President Truman's proclamation declaring United States sovereignty over the Continental Shelf.

The department rejected all applications for leases following the rendition of an opinion by the solicitor that the Mineral Leasing Act, as amended, does not apply to the submerged coastal areas. The opinion was confirmed by the Attorney General.

Forecast Indicates Continued High Production for Texas

The Bureau of Mines' upward revision of estimates of oil demand during the last quarter of 1947, with even stronger demand calculated for the first quarter of 1948, indicates continued high production from Texas.

The record net allowable of 2,534,393 barrels set by the Railroad Commission for Texas during September likely will not stand since that state must be depended upon to supply a great portion of the increase. Even the record figure is in excess of the Bureau of Mines' forecast of 2,290,000 barrels.

The trend should be in evidence when the Texas Railroad Commission holds its statewide proration hearing September 17 to set October allowables.

Texas Hearing Set

A public hearing to give the 60 operators concerned a chance to express their views before the Texas School Land Board sets the policy under which state leases will be extended from the present 25-year term to periods running as long as production in commercial quantities is had, will be held September 15. John H. McQuown, engineer employed by the Board to help in making the extensions, has urged the operators to attend the hearing.

Hot Potato?

Price Probe Dropped

A grand jury investigation into gasoline prices in the District of Columbia was halted abruptly last week with no explanation from the Department of Justice.

The inquiry was dropped after a number of major oil company officials and filling station operators testified before the jury behind closed doors, and apparently the jury found nothing in their testimony to support government suggestions that company policies violated the antitrust laws. A department spokesman pointed out that the term of the present grand jury is drawing toward an end and a new jury will be empaneled next month, but did not say definitely that the government would revive the matter then.

Drive to Separate Activities Of Oil Firms Is Planned

A vigorous drive for Congressional legislation divorcing the activities of production, refining, transportation and marketing will be spearheaded next year by the National Oil Marketers Association.

That legislation, according to William Earle White, president of the association, will seek to break up oil monopolies which, he said, "are really communistic because they set up the very conditions which make government seizure inevitable and easy."

The measure to be sponsored by the NOMA would make it illegal for any company to engage in more than one of the industry's four branches.

The association has worked for oil legislation of this nature for more than a decade. Its decision to step up the campaign apparently was based on a government antitrust suit against the major companies in the motion picture industry, which is integrated along lines similar to those in the oil industry, in which a federal court ordered the divorcement of production from distribution and exhibition. The final appeal in that case will be argued before the Supreme Court during its 1947-48 term.

First Refinery Sold Under "Government-First" Policy

First aviation-gasoline refinery to be disposed of by the War Assets Administration under its new policy of giving preference to bidders who will agree to sell product to the Army and Navy is the Texas City refinery operated by the American Liberty Oil Company, sold to the Petrol Terminal Corporation of Philadelphia for $3,250,000.

The Petrol Corporation will give the Army and Navy first call on 100 percent of the refinery's output this year and an option on the same volume next year. The plant, designed for the production of 100-octane gasoline, had an output of 100,000 barrels a month during the war.

Special Session of Congress Likely

Calling of a special session of Congress to deal with the European Crisis is becoming increasingly likely.

Such a session would have aspects of importance to the oil industry, because of its stake in the European market and its interest in European production. Also, it would provide an opportunity for early resumption of several oil investigations which have been slated by congressional committees for next year, some of them with a view to the 1948 presidential campaign.

Administration officials have been cagey in talking about a special session, in the absence of a definite statement from President Truman, but State Department officials have indicated their belief that it will be necessary to call Congress back to take steps to save Europe from cold and hunger next winter.

The situation in Europe already has seriously affected the oil industry. Lack of dollar exchange has caused France to order a sharp curtailment in gasoline consumption, and in other countries the lack of dollar exchange will mean the purchase of less American oil and other commodities.

Oust Communists or Lose Bargaining Rights, Unions Warned by Court

See Panorama, Page 25

Unions which fail to comply with the provision of the new Taft-Hartley labor law which requires filing of anti-Communist affidavits are not eligible for certification as a bargaining unit, according to a Federal District Court ruling last week in Fort Worth.

This may establish a precedent for requiring unions to file such affidavits before than can take cases to the National Labor Relations Board.

The issue was raised when the CIO Oil Workers International Union asked for a court order requiring the NLRB to count ballots that had been cast in a bargaining election by employes of Deep Oil Development Company, Wichita Falls, Texas. The Labor Board's general counsel, Robert N. Denham, had ruled the ballots could not be counted because the union had failed to file the anti-Communist affidavits.

In ruling that the OWIU was not eligible for certification as a bargaining unit, Federal Judge Davidson upheld the non-Communist portions of the Taft-Hartley law as legal, consistent and proper. "The constitution guarantees a representative form of government," the judge declared, "and it is consistent and proper to throw restraint around any organization by denying privileges to those who would destroy this form of government."

The judge also said that "Communism is recognized as not being a representative form of government. Communism is more the dictatorial type."

The OWIU had contended that its constitution bars Communists from membership and officers' positions, but Judge Davidson held that the union was an affilite of the CIO which has not complied with the law and which has policy influence over its constituents.

Neither CIO nor AFL officials have filed affidavits swearing they are not Communist sympathizers, although a number of independent unions have done so. Should the district court's decision be upheld, all affiliates of the CIO and AFL unions may become ineligible for certification as bargaining units and also lose the right to take cases before the NLRB if their officials continue to persist in not filing non-Communist affidavits.

The unions probably will exercise their right to appeal to the top NLRB members, which reportedly do not agree with Chief Counselor Denham's interpretation that parent organization officers need to file affidavits.

Program Is Announced for Petroleum Division Session

The program for the annual Petroleum Mechanical Engineering Conference of the ASME to be held at the Rice Hotel, Houston, October 6-8, is as follows:

October 5

2 p.m. to 8:30 p.m., registration.

October 6

8:30 a.m. to 8:30 p.m., registration

10 a.m. Materials (technical sessions): "Application and Handling of Foams," E. E. Kearns, Standard Oil Company of Ohio; "Corrosion of Oil Well Equipment," L. C. Case, Gulf Oil Corporation.

10 a.m. Equipment (technical sessions): "Accessories for Good Operation of Storage Vessels," F. L. Goldsby, Chicago Bridge & Iron Company.

12:15 p.m., welcoming luncheon.

2:15 p.m. Transportation (hydraulics); "Heavy Crude Oil and Fuel Oil Handling," E. L. Adams, General Petroleum Corporation; "The Application of New Designs in Plunger Pumps with Some Comments on Handling of Viscous Crudes," L. T. Gibbs, Aldrich Pump Company, and T. R. Aude, Stanolind Pipe Line Company, Tulsa.

2:15 p.m. Materials (welding): "Study of Weldments in Alloy Steels and in Alloys," T. N. Armstrong, The International Nickel Company; "History of Some Austentic (18-8) Furnace Tubes," C. S. Pugsley, Standard Oil Company of New Jersey, Baton Rouge, La.

4:45 p.m., meeting of general committees on transportation and materials.

7 p.m., meeting of general committee on equipment.

8 p.m. Transportation (intermixing of products): "Intersurface Characteristics of Products in Products Pipe Lines," S. S. Smith and R. K. Schultze, Shell Oil Company; "Control of Comingling in Products Lines," E. A. Bige, Plantation Pipe Line Company, Atlanta; Supporting papers from Sinclair Prairie Oil Company and Phillips Petroleum Company.

8 p.m. Refining (internally insulated vessels): "Internally Insulated Piping and Pressure Vessels for High Temperature Service," P. E. Darling, Pan American Refining Company, Texas City; "Effect of Leakage Around Cross-Baffles in a Heat Exchanger," A. M. Whistler, C. F. Braun & Company, Alhambra, Calif.

October 7

8:30 a.m. to 5 p.m., registration.

9 a.m. Transportation (natural gas transmission): "Notes on Natural Gas Transmission, Including Centrifugal Compressors for Natural Gas Transmission," W. H. Stueve, Oklahoma Gas & Electric Company, Oklahoma City.

9 a.m. Production (pumping): "Comparison of Prime Movers for Pumping Wells," J. H. Field, Standard Oil Company of Ohio, Oklahoma City; "Hydraulic Pumpers for Shallow Wells," A. A. Hardy, W. C. Norris Manufacturer, Tulsa.

11:30 a.m., meeting for general committees on production and refining.

2 p.m. Inspection trips of interest to production and pipe line engineers, refinery engineers, and of general interest.

6 p.m. "Get acquainted" party for all in attendance.

7 p.m. Banquet, open to all.

October 8

8:30 a.m. to 3 p.m., registration.

9 a.m. Equipment (pressure vessel design): "Investigation of Stress in Vessels Under Internal Pressure," T. L. White, Commercial Shearing & Stamping Company, Youngstown, Ohio; "Manufacture and Application of Composite Plates," O. R. Carpenter, Babcock & Wilcox Company.

9 a.m. Production (drilling and casing design): "Internal Combustion Engine Power Application for Rotary Drilling," W. S. Crake, Shell Oil Company, Houston; "Some Factors Influencing Selection of Factors of Safety in Casing Design," E. N. Kemler, New York University.

12 Noon, petroleum executive committee luncheon.

2 p.m. Production (pumping): "Free Pumping System," W. F. Slater, Kobe, Inc., Los Angeles; "Subsurface Sucker Rod and Gas Lift Pumps," R. L. Chenault, Oil Well Supply Company, Oil City, Penn.

Rules Allowing Development Of Public Lands Prepared

New regulations permitting the resumption of development work halted on the public lands during the war have been prepared by the Bureau of Land Management, under which nearly 1000 applicants for oil and gas leases will have a right to reinstate their applications when termination of the "war service" of the land is officially announced.

A very considerable amount of oil and mineral land was set aside for war purposes and apparently much of it will be restored to the public domain in the near future.

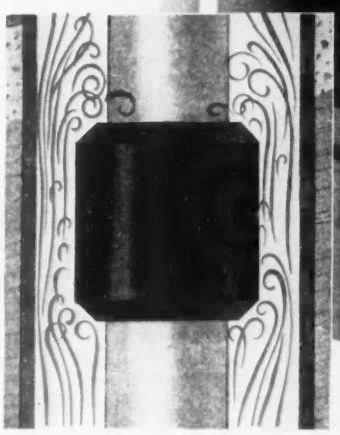
There will be no automatic blanket reinstatement of all applications pending when the lands were withdrawn and a separate request for reinstatement will be required for each such application.

Upon announcement of the termination of the "war service" of withdrawn lands, holders of previously-rejected applications will be accorded a preference period of 153 days in which to seek reinstatement. A preference period of 60 days will be accorded applicants where the land areas were set aside by a special US permit.

Texas Well Permits

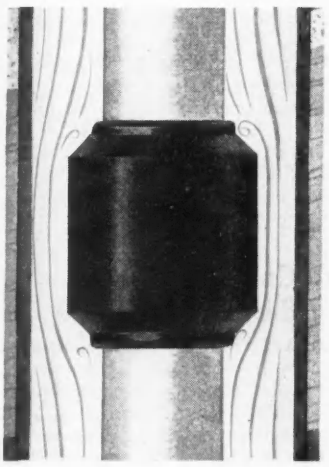
Permits to drill 255 new wells in Texas were approved by the Texas Railroad Commission last week. There were 25 in North Texas and 41 in Southwest Texas. West Texas reported 114 permits, and there were 15 from East Central Texas, 19 from the Gulf Coast, 26 from West Central Texas and 15 from the Panhandle.

Why this Special Rubber Lip saves your drill pipe



Exclusive Lip feature on Patterson-Ballagh Protectors prevents dangerous "Ringing" of drill pipe.

Have you noticed there is seldom "ringing" of drill pipe above the modern Patterson-Ballagh Lipped Protector? You will remember the first Protectors were flat on the ends and around the end was often seen a ring of fresh rust eating into the metal to weaken it.



Several years ago Patterson-Ballagh engineers looked into this "ringing" of drill pipe. They found modern slush pumps circulating mud 300 feet per minute or faster. Mud velocities at points between casing and tool joints or protectors was often 10 to 20 times normal. Here, the flat ends of the protectors caused most turbulent swirling. Fine abrasive particles whirled in the swirls like tiny grindstones to scour off rust around the protector end, leaving a ring of clean metal ready to rust again. This happened over and over, eating deeper and deeper.

Already having a perfect abrasion resisting PBX Special Rubber in their Protector, Patterson-Ballagh engineers redesigned *the shape*. They streamlined it to reduce turbulent swirling. They added lips to deflect solid particles away from the metal and shield it completely at points where "ringing" could occur. That is why you find little ringing of this kind when you use Patterson-Ballagh Casing Protectors. Lips also prevent ringing due to cavitation and to corrosion by alkali muds when pipe is standing in the derrick. This means *fully protected pipe as well as casing*. It will pay you to see your Patterson-Ballagh man and protect your drill string 100% now.

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Charges Of Unauthorized Prices Paid By Government for Oil Products Probed

A House Expenditures subcommittee last week initiated an investigation of alleged unauthorized increases in prices paid by the government for petroleum products, questioning Treasury procurement officials regarding modifications of contracts with various suppliers.

Following the end of price control and as oil prices increased, oil suppliers appealed to the Federau Bureau of Supply for relief under longterm contracts by which they had obligated themselves to furnish products at prices based upon coditions prevailing when the contracts were signed.

Faced with a situation in which its suppliers stood to lose considerable money, the bureau reluctantly agreed to increases, but the Comptroller General refused to approve such action and ordered the bureau to proceed with recovery of the increases paid.

Subcommittee Chairman George H. Bender of Ohio said a full investigation would be made of the increases, which he said appeared to have been unauthorized, and a monopoly angle was added to the inquiry by Representative John W. MacCormack of Massachusetts, who suggested an antitrust investigation of the prices charged the government for oil.

Bender said about 150 contracts are involved, let by the bureau between April 1 and July 31, 1946, under competitive bidding, a number of which were amended following the decontrol of oil, it being estimated that as a result the government paid as much as $2 million above the epproximately $10 million to which is originally committed itself.

The investigation, Bender said, will go into the conditions under which the contracts were amended and the steps taken by Treasury officials to determine they had authority to act; whether it was absolutely essential to grant price increases in order to secure delivery of oil, and the proof received by the Treasury; the equitability of the formula used in the Treasury amendments; what recovery, if any, has been made of the excess payment made by the government; the status of the present oil procurement program, and whether bona-fide competitive bidding exists in oil.

In addition, he disclosed, the subcommittee has requested Attorney General Tom C. Clark to report on any evidence he may have that the nation-wide price increases which followed decontrol were the result of collusive action on the part of the oil industry.

Revision of Federal Supply Bids Procedure Is Urged

Revision of bid conditions of the Bureau of Federal Supply to permit small refiners to participate in government oil purchases is urged by the National Tank Truck Carriers, Inc.

The association charged that the government now will not consider bids naming a price f. o. b. at the bulk plant of an oil firm on 150,000 gallons or less, if it receives any bids priced f. o. b. destination. This, it was declared, nullifies the government's right to name the type of transportation to be used and precludes any company lacking adequate transportation facilities of its own from bidding on government contracts.

C. Austin Sutherland, secretary-manager of the group, outlining the situation in a letter to W. E. Gannon, purchasing officer for the bureau, suggested that future bid forms provide for the showing of price at the bidder's plant and, separately, an amount to cover cost of transportation.

Senate's Conduct of Supply Investigation Is Assailed

The Senate small business committee's conduct of its investigation of short supply in the petroleum industy was assailed and its chairman, Senator Kenneth Wherry (R., Neb.) sharply criticized for "political witch-hunting."

Bernard L. Majewski, vice-president of Deep Rock Oil Corporation, in a strongly phrased letter to Wherry, said the committee's oil subcommittee type of "inquisition," referring to its late-August Chicago hearing, has impugned integrity and loyalty of "thousands of fine American citizens representing small and large petroleum operations and leaves them in a state of suspended judgment which does neither justice to them nor credit to the Congress."

Conceding existence of a short supply of petroleum products, Majewski, long known as a leader of and spokesman for independent petroleum refiners and marketers, said, however, that the practices of the subcommittee under Wherry "cannot be classed as fact-finding enterprise and is a waste of taxpayers' money" and "should be stopped as it serves to reduce the prestige of Congress."

He denounced quoted conclusions of Wherry that the first Chicago session proved that "certain practices by major oil companies and their integrated operations are causing practical elimination of the smaller independent businessman at every level in the oil industry." He declared the transcript reveals no proven evidence even remotely suggesting such conclusions.

Majewski also attacked charges by George F. Meredith, a committee staff member, "that there seems to be a general business practice now to restrict output and raise prices and that there is some indication of that trend in the oil industry." Majewski said the committee cannot help the rank and file of small businessmen engaged in production, refining, transportation and distribution of oil as long as it has Meredith and Paul E. Hadlick on its staff.

He said the petroleum industry was making a magnificent attempt to combat the current tightness of supply which exsits, particularly in the Middle West, he added, primarily because of limited transportation facilities caused by shortage of steel for constructing new facilities.

He suggested that in future committee hearings qualified and informed persons in government and the petroleum industry be invited to give competent testimony and data on what appears to be a critical situation which seriously affects the public welfare.

Oil Industry Authorities To Speak at AIME Meeting

At the first postwar regional meeting of the American Institute of Mining and Metallurgical Engineers, to be held in Denver, September 28 to October 3, mineral engineers and technologists from all over the U. S. will discuss current and future developments in the mineral industry. Dr. A. B. Parsons, secretary of the Institute, announced that the technical sessions to be held at the Shirley-Savoy Hotel will embrace the manifold problems of the petroleum industry as well as mining and concentration of ores and will indicate the trend of future developments.

Authorities in their respective fields will present papers which will be of wide interest to producers and users of mineral products. Everette DeGolyer, prominent petroleum engineer, will discuss the petoleum reserves of the U. S., and Gustav Egloff, director of research, Universal Oil Products Company, will analyze modern refining methods. An oustanding feature of the petroleum session will be the presentation of a series of papers by E. D. Gardner, Tell Ertl, Boyd Gutherie, J. D. Lankford and others, on oil-shale reserves, and techniques now being developed for mining and processing of oil shales.

Structure-Contour Map of Big Horn Basin Is Available

An extensively revised geologic structure-contour map of the Big Horn Basin, Wyoming and Montana, originally issued in March, 1944, as Preliminary Map 3 of the Oil and Gas Investigation series, has been issued as Preliminary Map 74 of that series, Geological Survey Director W. E. Wrather announced.

The map, titled "Structure contour map of the Big Horn Basin, Wyoming and Montana," by William G. Pierce, David A. Andrews, and Jewell Kirby Keroher, has been issued as Preliminary Map 74 of the Oil and Gas Investigation series. Copies may be purchased from the director of the Geological Survey, Washington 25, D. C., at 50 cents each, and will be available for "over-the-counter" sale at the Geological Survey offices at Room 305, Federal Building, Casper; Room 234, Federal Building, Tulsa; Room 314, Boston Building, 828 17th Street, Denver; and 303 North 27th Street, Billings.

Contract Let for Line from Sunray's Beckett Refinery

Contract for construction of a six-inch oil line from Sunray Oil Corporation's newly purchased Beckett, Okla., refinery to tie-in for crude exchange with The Texas Company pump station at Velma, Okla., has been let to the Pipeline Service Company of Seminole, Okla.

Project will start September 15 and is scheduled for completion October 15, making it possible for almost immediate delivery of Velma pool crude to the Beckett plant.

A dual line will be laid later along the Beckett to Velma right-of-way of 15 miles, and then extended an approximate 79 miles direct from Velma to Sunray's second Oklahoma refinery at Allen. This section is scheduled for completion January 1, and the entire project will cost more than $1 million. The completed line, along with other lines, will deliver 20,000 barrels of crude oil daily to Sunray's Beckett plant.

Three pump stations will be built, one at Beckett, one at Allen and one near Wynnewood, Okla. Charging stock is to be pumped through the line from Allen to Beckett a sufficient number of days monthly to provide the refinery's still charging needs. Finished products will then be "reversed" back through the line for delivery of gasoline to the company's Allen units for further processing. At Allen the combined finished production of Sunray's two refineries can be delivered to the Great Lakes system via Sunray's Allen to Drumright line, recently completed.

Indiana-Pennsylvania Products System Completed by Sinclair

Sinclair Refining Company has completed a products system between its East Chicago, Ind., and Marcus Hook, Penn., refineries.

Originally the company's eastern lines extended from the Marcus refinery to Steubenville, Ohio, and had branches to Washington and Baltimore. The western system extended from the East Chicago refinery to Toledo, Ohio.

Recently completed construction has extended the latter system north to Detroit, south to Columbus, and east from Marion to Akron and Youngstown, Ohio. A link from Youngstown to Steubenville also has been completed, uniting the entire system. Products can be pumped either east or west between Steubenville and Toledo, conforming to demands within the area.

Sinclair is now constructing an extension of the line from Akron to Cleveland.

Pipe Line Map Error

The pipe line map which appeared on page 55 of the September 8 WORLD OIL erred in showing three different natural gas systems instead of just Dominion Natural Gas Company, Ltd., as purported. The other two systems shown were those of Republic Light, Heat & Power Company, Inc., and Penn-York Natural Gas Corporation.

The Dominion Natural Gas Company system consists only of those lines in the Province of Ontario, Canada. The Republic Light, Heat & Power Company system is comprised of two separate sections, one extending direct east from Niagara Falls and Buffalo to the Bristol field, and the other extending in a southwesterly direction from Farnham to Chautauqua. The Penn-York Natural Gas Company system consists of the eight- and 10-inch Y-shaped lines extending from the Harrison field in Pennsylvania with one leg going to Crittenden and the other to Silver Creek. At both Crittenden and Silver Creek the Penn-York system ties into lines of Republic Light.

Public Service to Dispose Of Facilities for $2,737,071

The Public Service Company of Oklahoma, Tulsa, has been given permission by the SEC to sell its gas utility properties to the Consolidated Gas Utilities Corporation for $2,737,071. The transaction includes disposal by the company of its gas production, transmission and distribution properties in accordance with the federal holding company act which prohibits operation of "incidental" businesses.

Crude Oil Production in the United States

(Estimates compiled by WORLD OIL. All figures indicate daily averages in barrels.)

STATE OR DISTRICT	PRODUCTION IN WEEK ENDED Sept. 13	Sept. 6
Alabama	1,100	1,000
Arkansas	76,000	75,700
California	925,000	924,200
Colorado	48,000	49,000
Florida	1,025	1,100
Illinois	175,800	178,900
Indiana	17,000	17,000
Kansas	298,900	284,750
Kentucky	25,000	24,500
Louisiana	432,600	433,150
North Louisiana	100,000	100,925
South Louisiana	332,600	332,225
Michigan	43,500	42,500
Mississippi	104,800	101,000
Missouri	100	100
Montana	24,000	24,000
Nebraska	600	550
New Mexico	117,800	116,500
New York	12,900	13,000
Ohio	8,500	9,200
Oklahoma	399,050	396,300
Pennsylvania	33,800	34,000
Tennessee	25	25
Texas	2,333,750	2,328,675
Tex. R. R. Comm. Districts:		
Dist. 1—South Central	24,275	24,150
Dist. 2—Middle Gulf Coast	160,675	160,500
Dist. 3—Upper Gulf Coast	499,875	498,000
Dist. 4—Lower Gulf-S.W.	247,600	246,700
Dist. 5—East Central	40,875	40,700
Dist. 6—East Texas Field	308,000	310,250
Dist. 6—Rest of Northeast	118,600	118,200
Dist. 7-B—North Central	40,975	40,750
Dist. 7-C—West Central	41,250	41,000
Dist. 8—West	637,650	634,950
Dist. 9—North	127,725	127,625
Dist. 10—Panhandle	86,250	85,850
Virginia	100	100
West Virginia	7,000	7,750
Wyoming	120,000	121,000
Tota United Stat s	5,206,350	5,184,000

Total stocks, foreign and domestic, September 6, 1947, as reported by the Bureau of Mines, were 226,154,000 barrels.

84-Mile, 20-Inch Ohio Gas Line Approved by FPC

The Federal Power Commission granted The East Ohio Gas Company, Cleveland, temporary authority to construct and operate 84 miles of 20-inch natural gas pipe lines in Ohio to take gas from the Big Inch line into the East Ohio main system.

East Ohio's application for a certificate of public convenience and necessity for construction and operation of the line, cost of which has been estimated at $3,200,000, will be heard September 17.

East Ohio is presently buying about 47 million cubic feet of gas daily from Texas Eastern Transmission Corporation, which operates the Inch lines, and has made arrangements to buy increased supplies of gas, contingent upon TET's purchase of the Inch lines from the government.

Imperial Oil's Leduc Line To Be Completed October 1

Imperial Oil, Ltd., is making good progress with its Leduc oil field pipe line system and, barring unexpected difficulties, should put the system into operation about October 1.

Work is being directed by Sam Coultis, president of Valley Pipeline Company and builder of that company's network of Turner Valley oil gathering and transport lines. The Leduc layout involves a system of three- to six-inch gathering lines (total length seven miles), connecting with an eight-inch transport line running eight miles east from the field to Nisku, a station on the Calgary-Edmonton railway line. Oil moves by rail from Nisku to Imperial's Clagary and Regina refineries.

Shell Completes 100-Mile, Six-Inch Products Line

Shell Pipe Line Corporation has completed its 100-mile, six-inch products line from the Sheridan field, Colorado County, Texas, to its Houston refinery at Deer Park.

The line is handling butane, isobutane, natural gasoline and distillate. Average throughput will be 3000 to 4000 barrels, though the line has a capacity of 8700 feet. It is being operated as a common carrier.

24-Mile Crude Line Planned From Quealy Dome, Wyoming

The California Company is preparing to lay a 24-mile, six-inch crude outlet from Quealy Dome to Rock River, Wyo., where it will connect with Utah Oil Refining Company's system.

Pennsylvania Line Approved

The Federal Power Commission has authorized the New York State Natural Gas Corporation to construct a new 6000-horsepower compressor station and approximately one mile of 20-inch connecting lines at a cost of $1,313,785, to enable it to take up to 75,000 Mcf of natural gas daily from the big inch lines in Greene County, Penn.

Efforts to Solve Austria's Oil Problem Watched by U. S.

Administration officials in Washington are following with interest the efforts of the four-power Allied commission on the Austrian peace treaty to solve the problem of Austrian oil, which may determine whether the draft treaty stands or falls.

The question of oil long has irritated U. S. occupation officials and the State department, because of Russia's failure to deliver promised oil to the U. S. authorities and her contention that all Austrian oil preperties were enemy-owned and subject to removal for reparations.

The American proposal for the disposition of Austrian oil, expected to be opposed by the Russians, encompasses the following points:

1. The Bitumen Law, formulated and drafted in Berlin following the 1938 Anschluss, was Nazi in origin and the Austrian government is not bound by any oil concessions granted under it.
2. Old production rights which the Germans acquired legally are German assets which may be transferrtd as reparations under the Potsdam agreement.
3. Old Exploration rights no longer exist, but the former owners of these rights have an equitable right to request concession rights of the same value from the present Austrian government. Under this provision, it was explained, the Russians could apply as "agents" of the former German owners.
4. All machinery installed by the Germans in the oil fields, regardless of their right to do so, are transferable German assets.

France Cuts Gasoline Rations In Move to Bolster Economy

Sharp cuts in gasoline rations, aimed at reducing consumption by 40 percent, have been ordered by the French cabinet as one of the "austerity" measures to be adopted to bolster up France's dollar-short economy.

Reports to Washington stated that pleasure driving is to be halted, persons who use their cars for work will have to stretch their September rations through November, and no gasoline will be issued for limousines, including those of government officials.

Pemex Lets Contract to Drill 100 Wells Under New Program

J. Edward Jones, president of Sugar Field Oil Company, Baton Rouge, obtained the contract to drill the first 100 of a minimum of 200 wells for Mexico's new exploration and development program. Signing of the contract was announced by Petroleos Mexicanos, Mexican government corporation.

The Mexican government, in "cost plus" terms, will issue five-year 6-percent bonds to cover cost of operations, plus 10 percent. In this way the contractor will be reimbursed for his expenses on dry holes and will be paid in oil from producing wells to the extent of the "cost plus" of the operation. Payment in oil will be made by Pemex on basis of 35 percent of the new wells' production.

Jones is reported seeking SEC permission to float a bond issue in the U. S. to cover the estimated $20 million of the drilling project.

Drilling Now in Progress on Big Australian Concession

Drilling with a heavy-duty portable rig, capable of drilling a 5½-inch hole to 3500 feet, is now in progress in the 100,000-square mile Australian concession jointly licensed to the D'Arcy Exploration Company, Vacuum Oil and Zinc Corporation.

The slim holes being drilled in this area, which lies to the north of Broken Hill, on the borders of New South Wales, Queensland and South Australia, are expected to confirm details of structures previously delineated by geophysical surveys.

An Australian government representative recently visited the area in Queensland held by the "Roma Pool" companies (Kaluma, Australian Oil Development, Roma Blocks and Roma North) to arrange for a geophysical survey.

Deep drilling equipment for the Shell exploration program in the Roma area will arrive this month but deep drilling on the concession is not likely to commence in earnest before 1949.

Richfield Oil Corporation of California is sending a party of geologists to examine the 200,000-square mile concession recently granted to Richfield in conjunction with the Australian Motorists Petroleum Company. This concession is in western Australia in the coastal area adjacent to the 25th S. latitude parallel and includes the islands near Shark Bay.

July Production in British Zone of Germany Up Slightly

Crude production in the British zone of Germany during July amounted to 50,307 tons (377,302 barrels) compared with 49,599 tons (371,772 barrels) in June. As a result of irregular power supply and of shortage of machinery, production is not increasing as rapidly as was hoped.

Output of the major German producing centers in July was as follows:

Schleswig Holstein-	
Hamburg	8,538 tons
Hanover	31,455 tons
Ems area	9,785 tons
Baden	616 tons

A German company, the Erdol A. G. has started drilling operations near Dietramsyell, in Upper Bavaria, and has reached a depth of 1100 feet.

The first shipment of crude for Western Germany since the capitulation recently arrived at Hamburg from Venezuela. 15,000 tons monthly will be imported and will be refined at the Ebano plant in Hamburg. It is estimated that by the end of 1949 nearly $15,000,000 will have been saved by importing crude oil rather than finished petroleum products.

Argentina's Fuel Production Falls Below Expectations

Concern is being felt in Argentina regarding its five-year plan for industrialization and rearmament. Fuel, a vital necessity, is falling far short of expectations.

Already, before the plan becomes effective, petroleum consumption has risen in 1946 from an expected 31,600,000 barrels to 47,700,000 barrels, and a further increase is indicated for 1947 when it has already been necessary to import more than 2 million barrels of crude and more than 3,750,000 barrels of fuel oil in addition to quantities of diesl fuel and lubricating oils.

While 1947 crude production is running about 1.6 percent higher during the first four months of the year than a corresponding period in 1946, the 23,200,000-barrel output in 1946 is still below the 27,700,000-barrel peak for 1943. The trend of imports is even higher this year, and indications are it will be necessary to import about 2 million barrels more crude than the record 6,390,000 barrels brought in during 1946.

Capital Hikes Registered By Iraq Petroleum Group

Capital increases totalling £1,860,000 have been registered by companies of the Iraq Petroleum group. New money is required for exploration and development purposes and shares created will be subscribed through the participating companies of Iraq Petroleum. Details of the capital increases of individual companies are as follows: Lebanon Petroleum, £100,000; Mosul Petroleum, £400,000; Petroleum Development (Cyprus), £10,000; Petroleum Development (Palestine), £300,000; Petroleum Development (Qatar), £400,000; Petroleum Development (Transjordan), £150,000; Petroleum Development (Trucial Coast), £100,000, and Syria Petroleum £400,000.

The newly concluded financial agreement between Iraq and the United Kingdom lays down the amount of sterling to be released from Iraq's balances during the next five years. It includes the release of sterling to cover the repayment by the Iraq government of £4,240,000 of outstanding advances by the Iraq Petroleum Company and associated companies.

Alberta Footage Drilled in July Sets All-Time Record

Alberta set a new footage-drilled record in July with a total of 101,706 feet with the previous record in June of 100,830 feet.

Footage drilled in the first seven months of 1947 was 389,767, compared with 218,694 in the same period of 1946, and a total of 401,920 feet for the entire year. The all-time annual footage-drilled record was set in 1944, with 597,838 feet. This year should break this record early in October, estimates of the year's likely record being somewhere between 800,000 and 900,000 feet.

By J. GORDON BURCH

MARBLE BLASTING CONSERVES Reservoir Characteristics

FRANGIBLE SHOT, of high elastic properties, are finding wide acceptance in cleaning production zone faces in wells which have dropped off from earlier records. A combination of impact, explosive disintegration of missiles, and uniform pattern indicate that this method is applicable to many wells where straight or squib shooting is inadequate. More than 2000 wells have shown improvement, ranging up to initial production, when reconditioned with the marble torpedo.

THE high cost of well servicing threatens to cause widespread abandonment of wells which should produce for years. But no producer, however rich he may be, can afford to spend money on reconditioning unless increased production will show a profit. It always has been a problem to get effective well servicing at a cost that the majority of wells can afford, but the problem has increased in size by the year as more and more profitable producers have become mariginal. The agate torpedo promises much for operators facing this problem. Wells can be brought back to productive capacity with it and at a cost that will allow a profit even on the small increases possible from mariginal producers. In many instances the results obtained with this tool have been startling. Some wells have been made to produce even more than they did when first brought in, and every well treated has responded up to its productive capacity.

A Gray County, Texas, well that had been brought in as a 30-barrel producer in 1926 had depleted to a production of zero and was to be plugged. Shooting was known to be extremely damaging in this particular soft, granite wash area; it had therefore not been artificially restored upon completion aside from the usual swabbing and bailing. It was treated with the agate torpedo and began immediately to produce 130 barrels. After two years it is still producing more than 100 barrels daily. In this case the treatment not only removed the congestion which had developed during the 19 years the well had been producing, but it also removed congestion caused by the drilling.

Extensive experiments carried on in developing the agate torpedo have tended to disprove many theories which heretofore have had general acceptance regarding the causes of pre-depletion retardment of production in oil and gas wells. A study of the characteristics and placement of substances causing the retardment of flow into the well bore has been made, and the experiments have shown definitely that congestion is localized at the well bore and is accessible to treatment. The only barriers to production are those present at the face of the pay section. When the surface is cleaned, leaving only the natural formation, all barriers to the flow of production to the bore are removed. Upon this simple principle rests the operation of the agate torpedo.

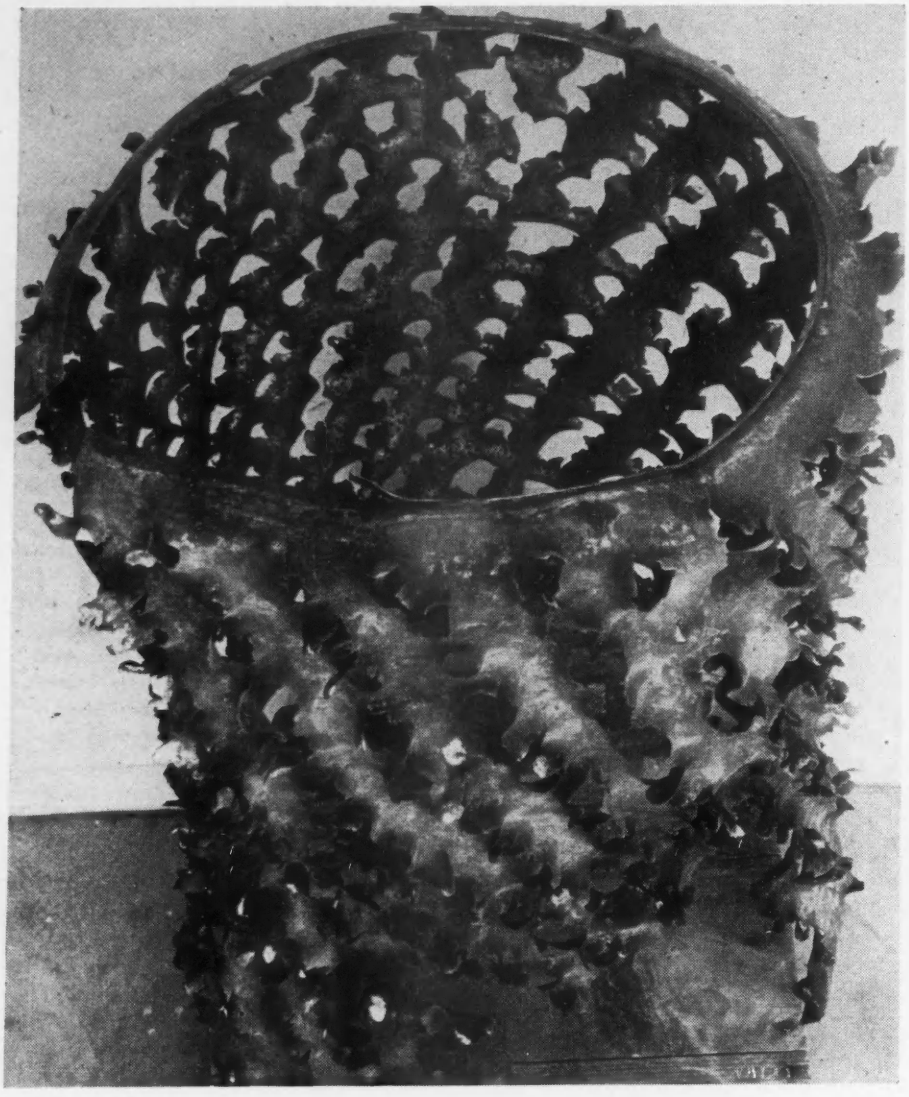
Congestion Problems

The porosity and permeability of natural formation are altered in the drilling, and unless reservoir pressures are great the drilling process causes severe congestion at the face of the bore. It is impossible to drill in a well leaving the formation open except in high-pressure pays. Improved muds have served to minimize the surface congestion created in drilling, but these improvements have served only to lower the minimum pressures at which the natural flow of oil and gas can be relied upon to clean the formation. Servicing problems are at a minimum in oil or gas fields where pressures are high, but in zones where the pressures are not sufficient to free the formation naturally, the wells must be restored artificially.

As wells continue to produce, sealing substances accumulate on the surface of pay sections exposed; in lower pressures they may become so dense that oil cannot enter from the porous formation. This is a natural reaction and is to be expected. These sealing substances retard production as they become increasingly dense. They embed themselves no more than a fraction of an inch in the formation but they anchor firmly, forming an impervious coating. There are various forms of this encrustment. Paraffin is quite common. Most of the encrustments, however, are mineral deposits having their origin in the chemical action of sulfur, gypsum and the many other salts present in the formation.

In maintaining a well's productive capacity the task is to remove these retarding substances by scaling the walls to a depth necessary to expose the natural formation. When this is done maximum production will enter the bore. No more oil can be produced from a well than the amount which migrates to the bore through the permeable formation, whether it migrates naturally or is moved by artificial production methods. So far as well treating is concerned, therefore, the limit is reached when the surface of the pay section has been restored to natural formation. The amount of work required to do this is not large. If it were possible to lower a man into the well bore, he probably could do in one day with a hammer and chisel all the work that is needed to scale away the congestion from the pay formation and thus restore the well to its productive capacity.

Simple cleaning methods have been



Thirty-inch steel drum that had been buried before shooting.

found practical in destroying these barriers during the earlier stages. But when the encrustment becomes increasingly dense, and simple cleaning methods are no longer effective enough to show a profit, more severity is needed in order to clean the wall completely.

Abrasive Action

The agate torpedo supplies the necessary severity to remove all production-retarding substances by applying a giant abrasive to the formation. In principle it might be compared with the air and solids used in sand blasting. Solids are propelled by high explosives at high velocity against the wall of the well bore in a uniform pattern.[1] These solids are unharmed at detonation, reaching the formation intact. They penetrate slightly, then disintegrate violently. Without regard to irregularities, this abrasive action resurfaces the walls completely and with the minimum disturbance of the contour.

Many mistakenly believe that a massive bulk shot of high explosive blasts a large cavity. It is true that the potential energy in the amount of explosive necessary to fully load the pay bore is tremendous, but at that depth the overburden cannot be moved and blasting cannot occur. The immensity of the earth's weight acts as a strait-jacket, confining the action of the explosive so closely that it performs only a small fraction of the work of which is capable. The effect of any shot of bulk explosive is the pulverization of the surface of the formation to a slight depth and to loosen the protruding irregularities.

It is incorrect to assume that the effectiveness of a shot can be measured by the amount of debris it drops into the hole. It is necessary only to clean a thin layer from the formation; anything more than that lengthens the cleanout period without increasing the production. The size of the reservoir has little influence on the volume of production. In profitable wells, each day's production travels a greater distance to the bore than any treatment could reach and it enters the bore continuously as it is produced. Bulk shots shear more of the protruding irregularities from the wall of the well than are dropped by the agate torpedo, but the effect of this excess debris is to increase cleanout costs only. The greater the wall irregularities, the bulkier the debris when bulk explosives are used.

The amount of debris cleaned from a well after shooting varies with types of formation. Shales, soft sands, rotten lime, chats and others have a tendency to slough unduly. Congestion caused by drilling in these types of formations tends to minimize the immediate sloughing by reinforcing the face of the bore, but when this congestion is removed by any method of cleaning sloughing continues.

In using explosives in lesser quantities than are necessary to fully load the holes, as employed in squib shooting, the amount of energy is sufficient but is ineffectually applied. The intervening air, gas or fluids between the explosive container and the surface of the bore materially cushion the shock of concussion. The slightest void lessens the severity with which the force of the explosive reaches the wall. The explosive containers tend to burst in a lightning split and the force is not exerted uniformly in all directions. The energy of the explosive in the gaseous phase is dissipated by expanding into any breaks, cavities or pockets, by-passing protruding irregularities. The treatment, therefore, becomes little more than a brushing effect and does not pulverize the formation enough to free the wall of congestion.

The agate torpedo uses squib proportions of explosives but applies the energy and velocity effectively by harnessing it to solids. The velocity of an explosive remains constant regardless of any quantity used, and a small column of explosive propels solids as swiftly as a larger column. These solids absorb and transmit the energy uniformly. They convert the greater portion of the energy into work which they perform by destroying the surface of the wall of the well. Their chiseling action minimizes the shearing of protruding irregularities and eliminates bulky debris.

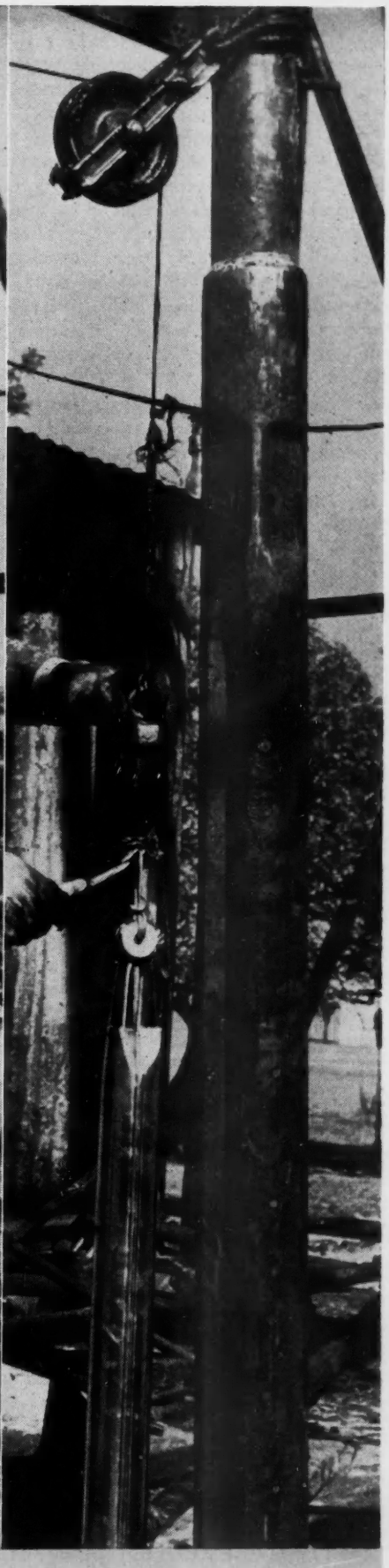
The design of the agate torpedo is the result of extensive experiments to determine what solid material could be used best as an abrasive, and what size column of explosive could be utilized for maximum results.

Experiments Tried

Cast-iron cylinders serrated as a hand grenade were tried, but regardless of how fragile the bonding, the explosive would break the casting into segments only. No advantage was gained in using

One-foot sample, representing new aluminum section, showing end finished with collar tightening bevel and stops; two of the four pressure equalizing holes for submergence; wires for securing to basket for proper alignment; and ½-inch expansion rolled on end of center tube to act as a funnel when filling with explosive.

Entire weight of torpedo suspended from single conventional pulley after double pulley has done its work while loading and is now ready to be released and detached from the line.



After bomb has been placed in bomb container and secured to basket wire, the tieon hook which would foul the release of the torpedo is removed and the entire torpedo is ready to be lowered.

glass cylinders, cast with protruding knobs. Round, unbonded iron balls gave a perfect pattern of hits, but they were not frangible enough to disintegrate. They caused more congestion by packing the formation at points of indentation. By remaining substantially intact, they added to the undesirable debris left in a well. Gravel was used as an experimental solid, but it is not practicable because the irregularly sized particles permitted overlapping, and gave the same effect as bonding which distorted the pattern of hits. The same objections apply to broken glass or any irregular-shaped projectile.

It was determined, therefore, that the projectiles used must be spherical, unbonded, and tightly spaced around the explosive container in a single layer. They must be of a material elastic enough to remain undamaged at the instant of detonation and to penetrate a slight distance into the formation still intact, and they must be frangible enough to disintegrate entirely after slight penetration. Heat-treated glass marbles as employed in the agate torpedo fall within the narrow limits imposed by these requirements.

The tool consists of two concentric fragile tubes.[2] Heat-treated glass marbles, five-eights inch in diameter, fill the annular space between the three-inch outer tube and the 1⅝ inch tube in the center containing the explosive. Each marble has only one point of direct contact with the explosive container and with each other marble adjacent to it. This arrangement leaves six identical openings around each marble. Since there is less resistance in these areas than at the point of contact, the explosive container forms confetti between the contact points of the marbles. The energy of the explosion is directed with uniformity through the six openings around each marble resulting in a uniform pattern of hits.

The agate torpedo fires 242 marbles per linear foot. Each marble strikes the formation with a penetrating energy equal to that of chiseling a five-eights-inch hole through one-half-inch steel plate. When the increasing resistance of the formation stops penetration, the marbles disintegrate violently with a sunburst blast toward the center of the bore. The 1⅝-inch column of 100 percent explosive used has the power of 2½ million foot-pounds of energy per linear foot. The kinetic energy of the marbles is tremendous because of the high velocity of more than 20,000 feet per second, and this energy is largely converted to work done in chiseling the encrustations from the face of the pay formations.

Although primary interest shown in this tool has been in its ability to clean the face of the well bore thoroughly,

Pouring glycerin in five-foot section being assembled for running.

other uses have been made of the tool with surprising results. Of equal value are the results obtained in pipe shooting. The amount of explosive used has enough power to shred pipe uniformly without damaging results. This is of major importance when it becomes necessary to rupture pipe barriers in wells where depleted pressures retard the volume of flow to a point where they no longer can be profitably produced by repeated perforations of the casing. The results give access to sealed production by rupturing the pipe, increasing the circumference concentrically to form what resembles a crude bird cage or metal basket.

A gas well north of Oklahoma City, Okla., could not be restored to a volume of 1 million cubic feet per day by repeated perforations. Yet when the pipe was completely opened by shredding with marbles, the well immediately responded with more than 7 million cubic feet of gas daily. It has been found however, that the smaller the pipe the more necessary it is to use fluid stemming or solid tamping. It is quite effective to use the agate torpedo untamped in six-inch pipe or larger, but with five-inch or less, fluid stemming or solid tamping should be used. Otherwise, the force is dissipated vertically. It is impossible, therefore, to demonstrate the effectiveness of the tool with experimental shots in short nipples of small diameter pipe.

Salt water disposal wells and input wells for pressuring become congested with solids. Formations tend to filter solids out of the fluids that pass into them. The marble shot is being used effectively to remove this sheath from the face of the bore.

Salt water disposal wells at Great Bend, Kansas, became so congested that it was impossible to use them for further disposal. With a 220-foot section of porous lime at approximately 3600 feet, their condition could not be further relieved by the repeated use of chemicals. After scaling this encrustment from the walls by use of the agate torpedo, it was possible again to use the wells to their original capacity.

The tool is being used also in lieu of an underreamer in wells that have been rat-holed deeper to increase the size of the small hole drilled to accommodate liners. Desired sections of squeeze jobs are being accurately reopened, underreamers started in drilled holes, and key-seated holes corrected. In most of these jobs, with minor adjustments for particular cases, this tool is being used open and untamped without damage to casing and liners. In casing and bores with a diameter of six inches or more it has been found practical to disregard oil levels, but when used in smaller diameter holes some fluid stemming is necessary to retain the proper function of the tool. Water levels should be below the casing before the torpedo is run.

Measurements

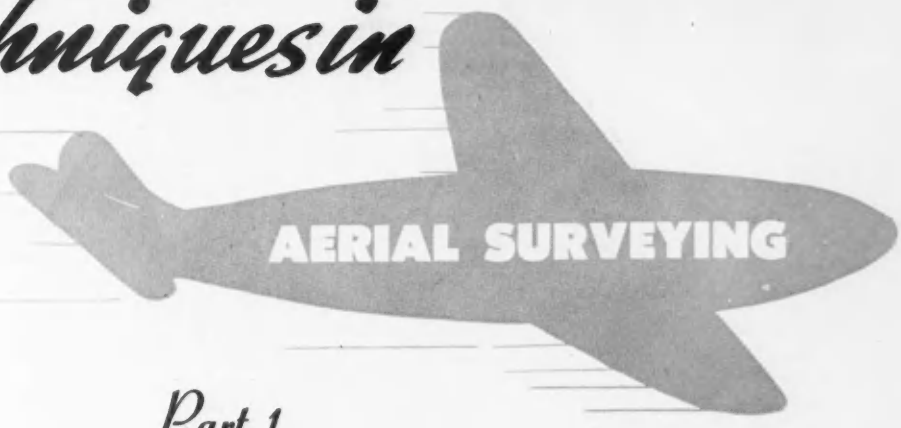
The torpedo weighs 16 pounds per five-foot section. It holds two-fifths quart of glycerin per foot, making the total weight 22½ pounds when completely assembled. It can be run with standard shooting equipment in columns long enough to cover the entire pay section. The entire length of each run of torpedoes is basketed for safety in running and to obtain rigid columns. Sections are placed in position, loaded and lowered until the basket is filled, and then the entire column is run from the shooter's reel. This eliminates the necessity of derrick lines and derricks. Best results are obtained by detonating the torpedo from the top.

It is not claimed that the agate torpedo can work miracles. If there is no more oil in the formation, no treatment can make the well a producer. But if the oil is there, the tool can be relied upon to clean the formation so that it can be produced. Tested in more than 2000 wells, the agate torpedo offers the operators a dependable reconditioning method at a low relative cost.

References

[1] Wells Successfully Conditioned with Explosive-Propelled Marbles. J. Gordon Burch. The Oil Weekly, August 14, 1944.
[2] Marble Torpedoes Prove Their Worth. Anthony Gibbon. The Oil Weekly, October 8, 1945.

Newer Techniques in AERIAL SURVEYING



Part 1

By DR. SHERMAN A WENGERD,

Assistant Professor of Geology, University of New Mexico

THIS IS the first of a series of five articles to be published in consecutive issues. The series will discuss advancements in photogrammetric processes, cameras, laboratory development and printing, in addition to field control methods and geologic interpretation of aerial photographs. Selected references on various phases of the subject will be published at the conclusion of Part 5.

FEW INDUSTRIES have made as much use of the airplane as has the petroleum industry. Numerous oil-producing companies, manufacturing firms, contractors, and independent operators operate their own planes. This, of course, is due to the widespread nature of oil operations and the frequent necessity of getting to a troublesome well or job in a hurry. It is surprising, therefore, that more direct application of aerial exploration was not made by the oil industry in the search of new petroleum fields within the U. S. prior to World War II.

Separation of engineering and geological duties in many major companies has resulted in the application of engineering staffs to varied and diverse problems of producing economically the oil found by geologists; whereas the geologists, embroiled with non-engineering theory, often do not find it necessary to make use of the engineering principles common in the every-day experiences of the petroleum engineer. This gradual process has led engineers away from those features of exploration which require aerial photogrammetric engineering. It may have led geologists away from the continued increase of engineering knowledge which would enable them to apply basic aerial mapping principles to the geologic interpretation of aerial photographs in oil exploration. Petroleum engineers may not have realized the need for interpretation of aerial photographs, and the petroleum geologists may not have retained enough engineering background to construct precise base maps on which to represent their geologic interpretations.

The purpose of this series is to present some of the newer engineering techniques of aerial photogrammetry and to stress the inherent dependence of accurate qualitative and quantitative interpretation of aerial photographs upon sound engineering principles. Detailed descriptions of many of these new processes already have been published and reference is made to those articles in preference to inclusion of such detail here. A more rapid acceptance of these excellent exploratory aids by geologists is not a little due to World War II, during which geologically-trained men were anxiously accepted for geodetic and photogrammetric training by the Navy and Army. Early in the war, the armed forces did not generally enlist geologists for their geological knowledge but for their ability in map interpretation.

Because so much of the world in which the war was fought had never been mapped, aerial photography was the vital high-speed process to which the services turned for excellent maps. Geologists, geographers, and architects had to learn precise map engineering! In the process, many geologists became photogrammetric engineers of high calibre. A byproduct of this engineering use of aerial photographs was a keener interpretative sense for what was recorded on the photographs. New engineering methods will be invented for making better maps from a set of photographs, but the quality of final geologic interpretation is directly dependent upon the experience of the geologist who examines the photographs. These two facts often have characterized the theoretical difference between the geologist and the engineer—a division of effort and ability which frequently makes concerted effort difficult.

Advantages of Aerial Photography

There are four basic advantages which aerial photographs present to the oil industry; namely, speed of coverage, accuracy of the maps, continuous reference, and accessibility of the aerial surveying technique to all terrain.

Not any one or all four of these advantages will ever completely replace ground surveying and detailed surface geology in problem areas. Aerial photographic mapping is sometimes considered by the uninitiated to be merely a matter of flying the area concerned. The geologist who has no experience in photogrammetry may interpret and delineate geologic contacts on vertical aerial photographs at a large scale with subsequent transfer by eye to a small scale base map. Only over level terrain can vertical aerial photographs be used in this manner without committing serious errors of mislocation.

Time necessary for engineering compilation of photographs often is not considered ([35]Sette-1938*). Maps are generally wanted "day before yesterday" —sometimes due to poor planning. The compilation time for an aerial photographic project is often used as an argument against aerial mapping. Precise aerial photographs compiled into accu-

*Guide to selected references will be published at the end of the series.

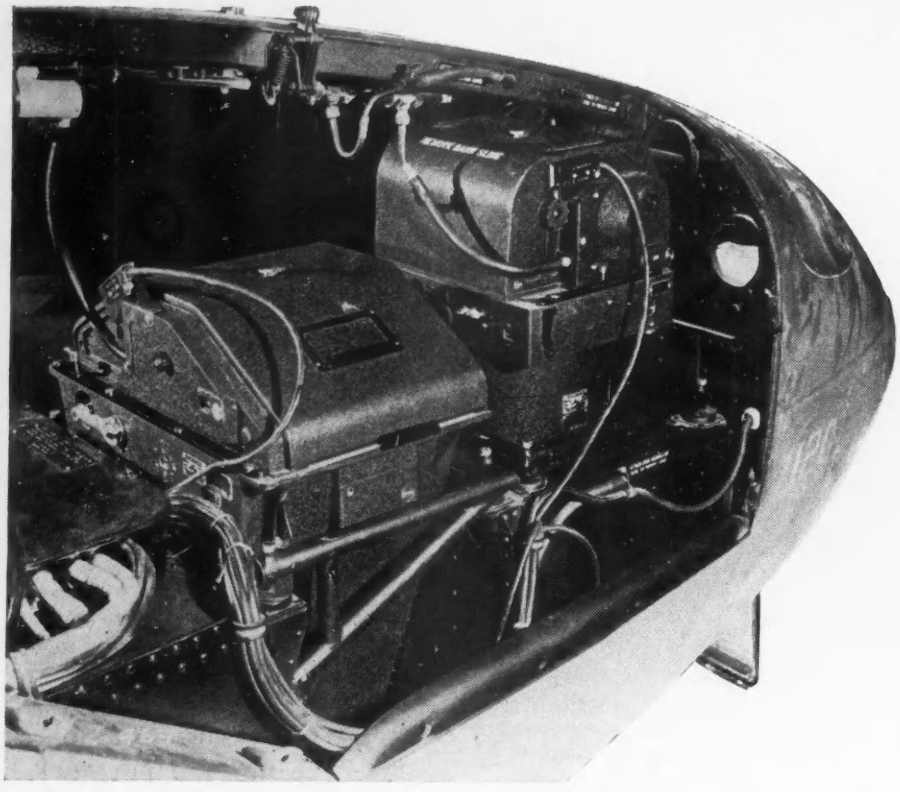


Figure 1. The K-17 mounted in front of the K-18 camera in the nose of a plane converted to an F-5 camera ship for the Army Air Forces. The cameras are operated through solenoids controlled by bank switches in the pilot's cockpit. This setup was widely used for reconnaissance high-altitude photography in gaining vertical coverage. The burden of keeping the cameras level falls on the pilot as he attempts to keep the ship on even keel.

—Photograph Courtesy Fairchild Camera and Instrument Corporation.

rate base maps and used in conjunction with field examinations can save surface parties and geophysical parties much time in the field. Accuracy of maps constructed from aerial photographs with an optimum of field control is greater than plane-table surveying under any given set of conditions and specifications ([35]Whitmore-1938), ([72]Whitmore-1941). Identification of geologic features and accurate geologic delineation of those features on base maps were formerly two widely separated functions. The geologist of today who deals with surface geologic features in attempts to bring virgin territory into oil production should know how to do both. In certain terrains, with good photogrammetric instruments, the apt photogeologist can rapidly and accurately do both with a minimum of field work and field control.

Reference Value

Aerial photographs are a continuous source of reference. Field work done by the cadastral engineer is seldom of use to the civil engineer who is charged with building lease roads, and the field surveying both do often is of little use to the geological engineer. If an area has been photographed from the air at a reasonable scale, those photographs are a continuous source of engineering data to all departments. A final advantage is the single one of accessibility. Photographs can be flown where horse and man cannot go and many disheartening months of bush-whacking are avoided in field work if the problem areas are found by photographic interpretation. Under optimum conditions, areas can be interpreted and mapped by photographic evidence without field examination.

The technique of photographic flying is a science in itself ([30]DeGarmo-1941). Lessons learned in World War II have advanced the techniques of precise photographic flying. Pilotage of faster planes smoother flying with the automatic pilot, better maps with which to fly areas, safer and more comfortable aircraft, more automatic photographic equipment, and greater range have resulted in vastly improved photographic flights. Many laboratory processes, their use largely accelerated by the necessities of war, have been made automatic ([39]Ask-1944). Development of aerial negatives, continuous-strip printing, continuous drying, and automatic film stamping in air-conditioned laboratories have all speeded the production of good aerial photographs. Photogrammetric processes involving pure photographic methods for mosaic construction, graphic and computational methods for the construction of planimetric base maps, and improved instrumental methods for the conversion of aerial photographs to accurate photogrammetric base maps have been devised within the last ten years and tested in the fire of war. Application of these techniques is vital to the many phases of the oil industry which require good maps.

New techniques have been discovered in the field of geologic interpretation of aerial photographs. The photograph often is used as a direct map which enables the field man to get where he wants to go. More effort is now being made to interpret the wealth of leg-saving detail which the aerial photograph affords. There is no substitute for extensive field mapping experience, coupled with photogrammetric training, for the would-be photogeologist, whose interpretative technique grows as his experience widens. The development of new interpretative techniques is largely a personal factor based on wide experience.

New Techniques

The end result of a carefully planned photogrammetric program is a series of maps at a suitable scale showing natural features in their true relation to each other. If the map shows these features without relief, it is generally known as a planimetric base map. If relief is shown by contours or form-lines, it is a topographic base map. The geologist, satisfied with less elevation data than a topographic map provides, can construct a good structural contour map by combining geologic contact interpretation with elevation data gained by precise photogrammetric measurements from aerial photographs. Base maps constructed from aerial photographs are valuable to (1) land men and scouts, when the maps are controlled by existing surveys; (2) production men, in acreage computation, lease planning, and the relation of producing fields and wells; (3) geophysicists, as field base maps on which to plot accurate elevations gained by traverse levelling; (4) geologists, as base maps for plane-table mapping of geology in areas which cannot be interpreted accurately from photographs, or as base maps for plotting contact elevations in areas whose interpretation is possible with a minimum of field examination.

New Developments In Photographic Flying

Aircraft Types: Aircraft suitable for economical commercial flying differ greatly from many of the aircraft adapted for military mapping. Photographic aircraft adopted by the military services for aerial reconnaisance and

precise mapping were ordinary military aircraft with long range and high speed. These factors are not so important in normal commercial work. Heavy gasoline consumption, high initial cost, high depreciation, great upkeep expense, and the necessity for large crews are factors that may prohibit the use of medium and heavy multi-engine military aircraft for commercial aerial photography. On large contracts where long-range work is required, some of the medium multi-engine military aircraft now are being used. Adaptation of the lighter, faster military planes to commercial work probably will be hindered by these same cost factors plus the disadvantages of a one-man crew.

Precise aerial photography requires an experienced photographer working with an experienced photographic pilot in a medium-range, small, single or twin-engine aircraft which has a low operating expense. Several photographic twin-engine ships, the AT-11, the P-38, the A-26 used during the war, are being used by commercial firms for contract flying. Despite high initial cost, they have sufficiently low operating expense for commercial photographic operations in most countries. Only one purely photographic ship has been put into commercial operation. This, a high altitude pusher-type aircraft built to specifications for flights up to 25,000 feet with a two-man crew ([19]Abrams-1939). The plane was never adapted to military photography because of its low cruising speed and its design as a purely photographic airplane. Features learned in wartime operations may be applied to this craft to bring about its wider acceptance by commercial firms for precise mapping ([25]Peace-1938). Further development of single-engine aircraft, which were successful in prewar precise photography because of their low initial cost and low operating expense, has brought about their wider acceptance in U. S. mapping where short range and medium operating altitudes are not economically limiting factors. The helicopter is as yet an unknown factor in aerial photography. The writer foresees a wide use of rotary-wing aircraft for controlled flying of precise photographs from areas where ground control is available into inaccessible areas where establishment of ground control is expensive. The helicopter is today of limited application as a photographic ship owing to its low service ceiling, low cruising speed, high gasoline consumption, and high initial cost. These limiting features will, however, be overcome by aeronautical engineers. Hovering, maneuverability, and safety are desirable features which probably will lead to future use of the helicopter in specialized aerial photography.

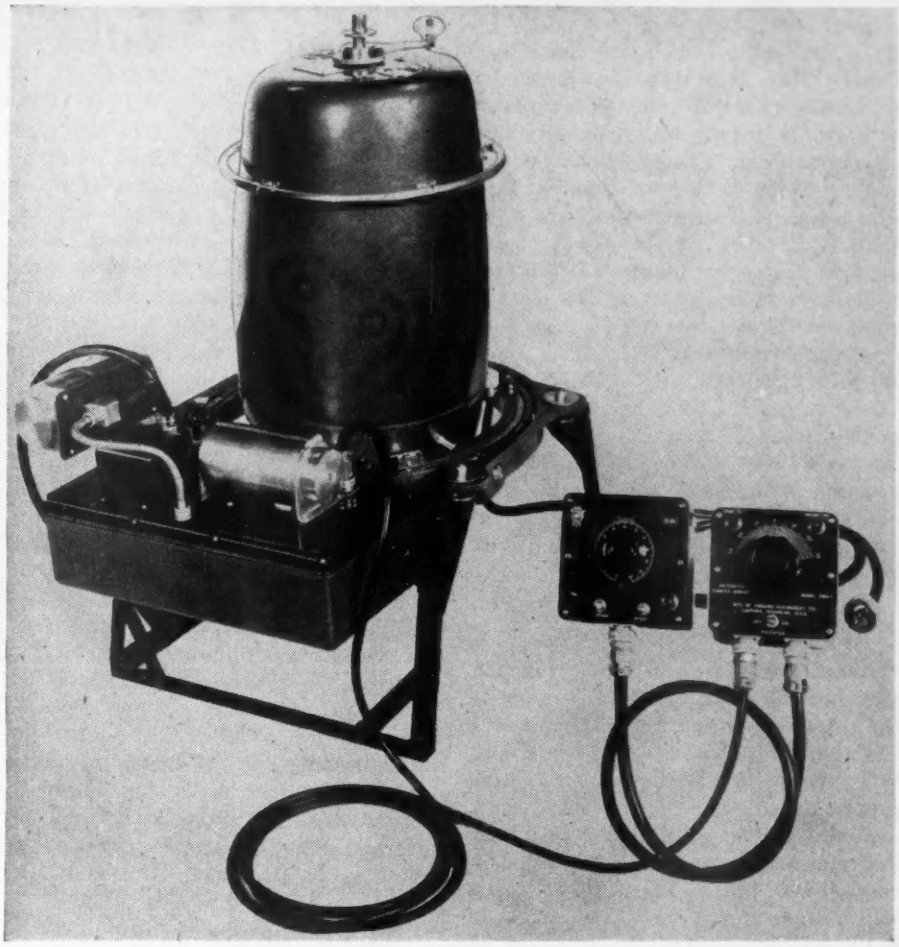


Figure 2. A new automatically horizontalized camera devised to produce vertical photographs through levelling of the camera by small electrical motors linked to photo-electric cells controlled by accurate level bubbles.

—Photograph Courtesy Abrams Aerial Survey Corporation

Camera Types: Development of the aerial camera as a precise mapping tool was largely inspired by military demands ([27]Sanders-1941). The history of aerial cameras is involved in governmental and military procedures modified and enhanced by civilian agencies to such a point that three countries, the U. S., England, and Germany, are responsible for the precision which can be obtained in aerial photography today.

Camera Development

Early development of the eight lens camera by Captain Scheimspflug of the Austrian Army in 1904 led to development of a tri-lens T-I camera by Major James W. Bagley, U. S. Army, in 1918. A fourth lens was added in 1927 to gain wider coverage, which led to the five lens T-3A camera in 1933. Impetus given this development by the Navy and Army led to adoption of aerial surveying techniques for mapping by several governmental agencies, notably the U. S. Geological Survey, TVA, and the Department of Agriculture. Commercial firms to whom government contracts were let for precise mapping soon learned of the financial posibilities of rapid aerial surveying, but commercial users of maps, such as the oil and mining industries, generally did not support the new mapping method early in its history. Attempting to satisfy the need for greater accuracy in aerial photography, several concerns began the development of a long line of single-lens cameras. Because of compilation and transformation complexities, the multi-lens cameras were no longer used for general mapping until the U. S. Coast and Geodetic Survey nine-lens camera was developed in 1935 for special coastal work ([26]Reading-1938). Precise mapping requirements led to development of the now famous work-horse of aerial photography, the K-17 camera using a six—or 12-inch focal length lens. The K-18 (24-inch focal length lens) camera and the K-56 (40-inch focal length) camera were developed just prior to the war. Battle-tested, these three cameras are now being used for precise aerial mapping. Other single-lens cameras of note are available in the U. S.

The most revolutionary photographic and photogrammetric procedure de-

veloped in the early part of World War II is Trimetrogon ([28]U. S. Army Air Forces-1944). Three K-17 wide-angle, six-inch focal length cameras are placed in a sturdy mount which permits one camera to shoot left, one straight down, and one to the right. Simultaneous exposure is insured by electrical operation of shutters. Flights for small-scale aeronautical charts are made at 20,000 feet with flight lines spaced at 20 miles. A complex photogrammetric procedure produces planimetric flight maps at a scale of 1:500,000 and 1:1,000,000. The advantages of this reconnaissance method can be realized readily when one sees the astounding world-wide coverage which Trimetrogon has provided for the Army Air Forces. A definite application of Trimetrogon to oil exploration will be cited later.

Continuous-Strip Camera

Another wartime development which may prove a boon to oil exploration is the continuous-strip camera. High-speed passage of film past a slit aperture, and film speed closely coordinated with ground speed of the plane, results in a continuous strip of film 200 feet long and nine inches wide showing the terrain flown. Variations in flight speed and altitude may result in slight scale variations which make direct use of continuous strip photographs difficult to use in precise mapping. A new method (announced by Kistler in "Photogrammetric Engineering" June, 1946), provides automatic synchronization of film speed and ground speed of the airplane, but continuous correction in the spatial relationships of the objects photographed is difficult on continuous strip film. A new floating-mark comparator which aids direct photogrammetric measurements on continuous strip prints was invented recently and its unrestricted production should enable the oil industry to adapt continuous strip photography to oil exploration and development of terminal facilities. Adaptation of color film for this camera, inspired by the need for depth determination of water over coral reefs, will prove a boon to the geologic interpreter of continuous-strip photographs of complex geologic structures.

A 35-millimeter continuous-strip camera was recently developed for the special Alaskan Magnetic Survey Unit in exploration of Naval Petroleum Reserve No. 4 in Alaska. This camera contains gyroscopically-controlled mirrors which keep the continuous image coplanar with the earth's surface at all times. It has produced continuous photographs 35 mm. wide for approximately 10,000 miles of Arctic flying over trackless wastes where no other means of location could be used. This technique of locating precise aerial mapping photographs in poorly-controlled areas is predicted for the near future.

About the Author

DR. SHERMAN A. WENGERD, formerly subsurface geologist for Shell Oil Company in the Mid-Continent area, now is assistant professor of geology at the University of New Mexico. He was released from active service as lieutenant commander in the U. S. Naval Reserve in December, 1945. Dr. Wengerd's earlier duties in the Navy entailed geodetic, hydrographic, and photogrammetric engineering for the Hydrographic Office at Baffin Island and the Western Pacific. At the end of the war, he was photogeologist for the director, U. S. Naval Petroleum Reserves in Washington and Alaska. These duties involved the laying out of flight lines for the flying magnetometer of the Special Alaskan Magnetic Survey, and the initiation of geologic interpretation of trimetrogon aerial photographs of Naval Petroleum Reserve No. 4.

Gyro-Stabilized Cameras

Development of gyro-stabilized cameras has not been successful enough to warrant wholesale adoption of the technique for precise mapping. One firm recently gyro-stabilized a light beam which flashed the plumb point of the aircraft directly onto the aerial film upon exposure. Residual lag in the gyro apparatus resulted in relatively unsuccessful operation of the controlled light beam. The Aerial Survey and Mapping Unit, in Pacific operations for the Navy, tested a gyroscopic camera which held the tilt of aerial photographs within three degrees, the maximum allowed for precise photography. Lag was found a serious detriment to quick vertical restitution of the camera when rough air was encountered. Commercial companies, interested in making use of all available flying weather regardless of air turbulence, have attempted to gyro-stabilize cameras and lenses with little success. The new development of stabilizing a mirror that transmits the image from the ground through lens to film may be the answer to the problem of getting truly vertical photographs for precise mapping.

Flight Specifications: Many factors control the specifications which will be followed in flying an area. A listing will suffice to illustrate the variables which greatly affect the economics of flight photography ([29]Albrecht-1939).

1. Size of the area.
2. Distance of the area from airfields.
3. Relief of the area.
4. Flight scale necessary for both map compilation and interpretation of terrain.
5. Type of data which can be extracted from aerial photographs of the area.
6. Type of photography needed in all or various parts of the area.

Little that is new has been discovered in the last few years concerning flight specifications ([30]American Society of Photogrammetry-1940). The war was not fought on an economical basis, hence our advancement in aerial photographic equipment and photogrammetric compilation equipment was not matched by an advance in engineering flight specifications. Large aerial photographic projects vary greatly in locale and use of the results; hence, variable flight specifications must exist to satisfy all the needs to which aerial photography may be put by the oil industry ([38]Woodward and Schlatter-1944).

The two factors of areal location and flight scale, with their attendant variables, are extremely important in economical, precise photographic coverage of an unexplored concession or lease block ([24]Meyer-1944). Flight specifications for flying in the U. S. may differ greatly from specifications which may apply in photographing a block in Yukon Territory of Venezuela. The vegetational cover and relief of the block control the amount of geologic interpretation which can be done on photographs, which in turn governs the flying height plus the type and focal length of cameras used. Distance of the concession from civilization controls overall operational cost while flying an area, and very seriously limits the choice of cameras and aircraft to get the coverage needed to ascertain the structural character of an area.

A splendid example of limitations which hamper photographic interpretation exists in the plateau and coastal plain of Naval Petroleum Reserve No. 4 on the Arctic slope of Alaska. Flight specifications must be given flexible limits, depending upon the precision necessary in utilizing the photographs. Although flak and enemy interference are not encountered in civilian flying, many natural hindrances cannot be

PLANS AND SPECIFICATIONS

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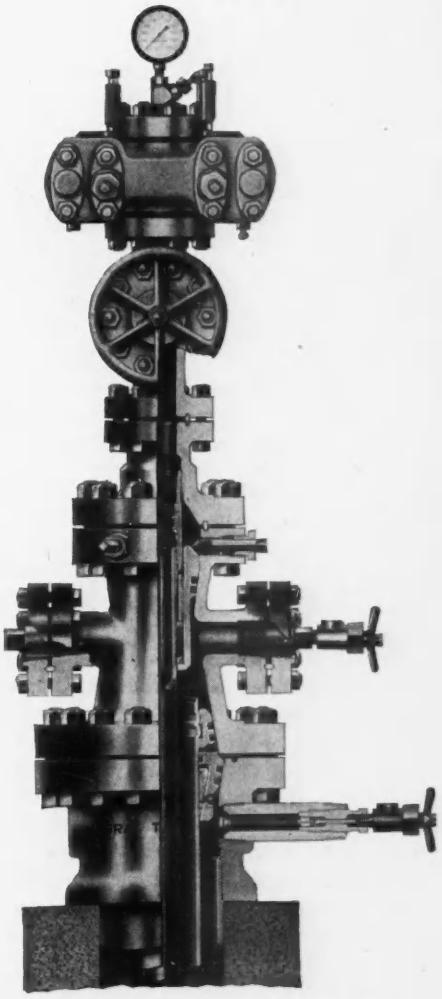

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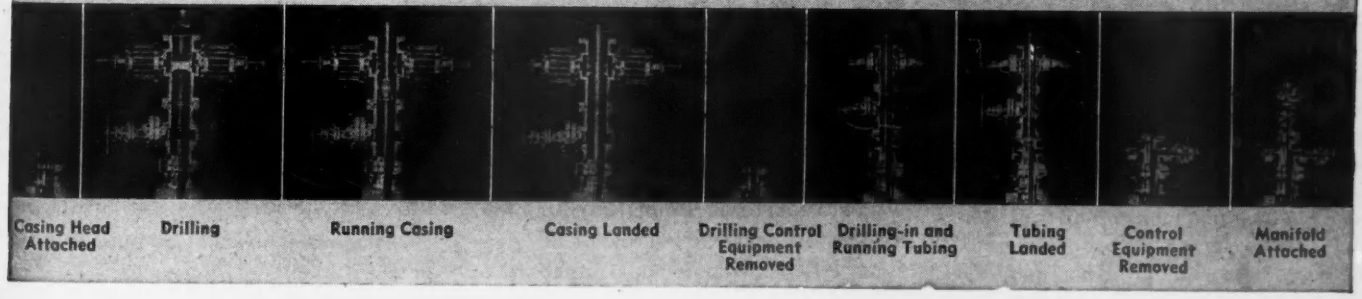

overcome in some areas. Contractual flying on a realistic basis is thus usually attempted with specifications which have strict maximum and minimum limits but sufficient lenience in those limits to allow economical completion of flight contracts. The impetus of total war has provided photographic equipment and trained personnel fully capable of staying within the relatively narrow prewar specifications needed for construction of maps with newer photogrammetric instruments.

Flight Specifications Example

A highly abbreviated example of flight specifications is given below:

"Photographs of the contract area, shown on the accompanying flight index maps, shall be flown with a six-inch focal length camera producing a 9x9-inch negative showing four distinct collimation marks which will allow accurate placement of the photographic principal point. Tilts, computed by the contractee by any of the prescribed methods, shall be kept below three degrees. Exact focal length, radial and concentric distortion, and resolution data on lenses shall be obtained from the U. S. Bureau of Standards for the cameras used in the project. The photographs shall have overlap not exceeding 65 nor less than 55 percent in the direction of flight. Overlap of one flight with another shall produce sidelap varying between 40 and 20 percent, (Optimum forward lap, 60 percent, sidelap, 30 percent). Crab variation up to five degrees from the line of flight will be allowed for any single photograph. A drift of ten degrees or over will be considered sufficient to discard whole or part of any flight line. The photographs shall be flown at a corrected sea level altitude of 10,000 feet. A 5 percent variation of the resulting contractual 1:20,000 scales will be tolerated. Four complete sets of semi-matted prints on Airmap Special low-shrink paper plus all negatives and flight index maps shall be furnished the contractee upon completion of the project flights."

Flight Maps and Flight Planning: Photographic flying in the U. S., though facilitated by some existing maps, is often performed with flight maps which are inadequate. Photographic flying with inaccurate maps generally yields costly lessons in economics. Techniques which have been learned during the war for the production of flight maps and their substitutes will no doubt be applied to the photography of unmapped areas. A flight map should have a scale larger than one inch to five miles and smaller than one inch to one mile. Maps with scales larger than one inch to a mile are unwieldy in flying long lines, whereas maps with a scale smaller than one inch to five miles seldom show enough check-point detail for accurate flight line work. The maps generally used in the U. S. are the U. S. Geological Survey topographic quadrangle maps, U. S. Coast and Geodetic Survey charts of coastal areas, general land office maps, and forest maps. Road maps can be used only to disadvantage owing to their small scale and lack of detail.

Reconnaisance flight aids must often be devised by aerial photographers working over unmapped territory. Four new developments have been proved by war-time use:

A. **Reconnaissance vertical photography** has been employed over areas where later large-scale precise photography is necessary. Short focal-length cameras flown at great heights (six-inch focal length at 30,000 feet) in the Pacific area produced photographs at scales up to 1:60,000 which were laid as matched uncontrolled mosaics. These mosaics were scaled by using the flight scale or distances between recognizable points measured on Japanese charts. Flight lines, computed on the basis of longer focal lengths and lower flight altitudes (example: 12-inch lens at 10,000 feet), were laid out for precise photography. Though this double technique is uneconomical in all but the wildest inaccessible terrain, it produces by far the best flight maps if some measure of control for the mosiac can be gained from old small-scale maps. Over completely unmapped territory with few check points, this technique provides an easily-interpreted photographic guide for the pilot and may be the means whereby precise photography can be accomplished.

B. **Trimetrogon photography** is famed for its rapid coverage of great areas at low cost. Compilation of these flight strips flown 20 miles apart at an altitude of 20,000 feet with three 6-inch focal length cameras results in 1:80,000 and 1:100,000 scale planimetric maps showing abundant detail. Publication of the aeronautical map resulting from these planimetric compilations is generally completed at scales of 1:500,000 or 1:1 million. These scales are too small for use as flight maps in gaining accurate vertical coverage of an area to be photographed. Original compilations of Trimetrogon photography at a scale of 1:100,000 (1 inch = 1.58 miles) were used in magnetometric and photographic flying over Naval Petroleum Reserve No. 4 in Alaska during the 1945 season. Prior Trimetrogon photography for construction of flight maps plus initial geologic interpretation of those same photographs can prove highly economical and enables the exploration planner to concentrate vertical precise photography over suitable areas.

C. **Strip flying,** as a technique suggested prior to the war for unmapped territory, was developed by the U. S. Navy in photographing certain Central American coast lines. The poor quality of existing maps resulted in their discard when precise photography of the coast lines was necessary for hydrographic charting. An area to be flown was traversed by three to six strips of vertical photography from the mountains to the coast line. The strip was stapled to fiber board and roughly controlled by two cross strips which spaced the original flights. Flight lines were drawn on the resulting patch-work mosaic and the whole board copied down to one-fourth the flight scale of the initial flight reconnaissance photography. The resulting flight maps were remarkably accurate and saved up to 50 percent of the reflights formerly wasted in getting coverage using old, inaccurate, coastline charts.

D. **Horizon obliques** were developed as flight maps by the writer in 1944 while with the Aerial Survey and Mapping Unit of the Navy in Hawaii and during 1945 while with U. S. Naval Petroleum Reserves in Alaska. The horizon oblique is any oblique photograph which shows a horizon. All straight lines on the ground are straight lines on the photograph provided the area photographed is substantially level, such as the coastal plain of northern Alaska. By comuptational methods developed in Canada, a flight, scale-line can be constructed near the lower edge of any oblique photograph showing a horizon near the top of the photograph ([78]Canadian Topographical Survey-1928).The true horizon is reconstructed above the apparent horizon, and flight-line spacing is made on the isoline or flight scale-line. The direction of flight line is established by estimation in relation to the area to be covered and all flight lines are drawn from the isoline to a vanishing point on the true horizon. It was found that experienced Naval aviators could follow these flight lines plotted across obliques until fatigue required turns and starts on new lines. Experience in the Pacific proved that oblique flight lines plotted on high-altitude horizon obliques could be followed across terrain relief of over 1000 feet by careful check point identifications in valleys. Adherence to rigid specifications was possible despite relief distortion if care was used in identifying check points lying near a common level on the oblique photograph.

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- V-BELTS
- VIBRATING SCREENS
- VISES

A
- ADJUSTABLE CHOKES
- AIR HOSE
- AQUAGEL
- AUTOMATIC CATHEADS
- AXES

I
- IDLERS
- IMPERMEX
- INDICATING GAUGES
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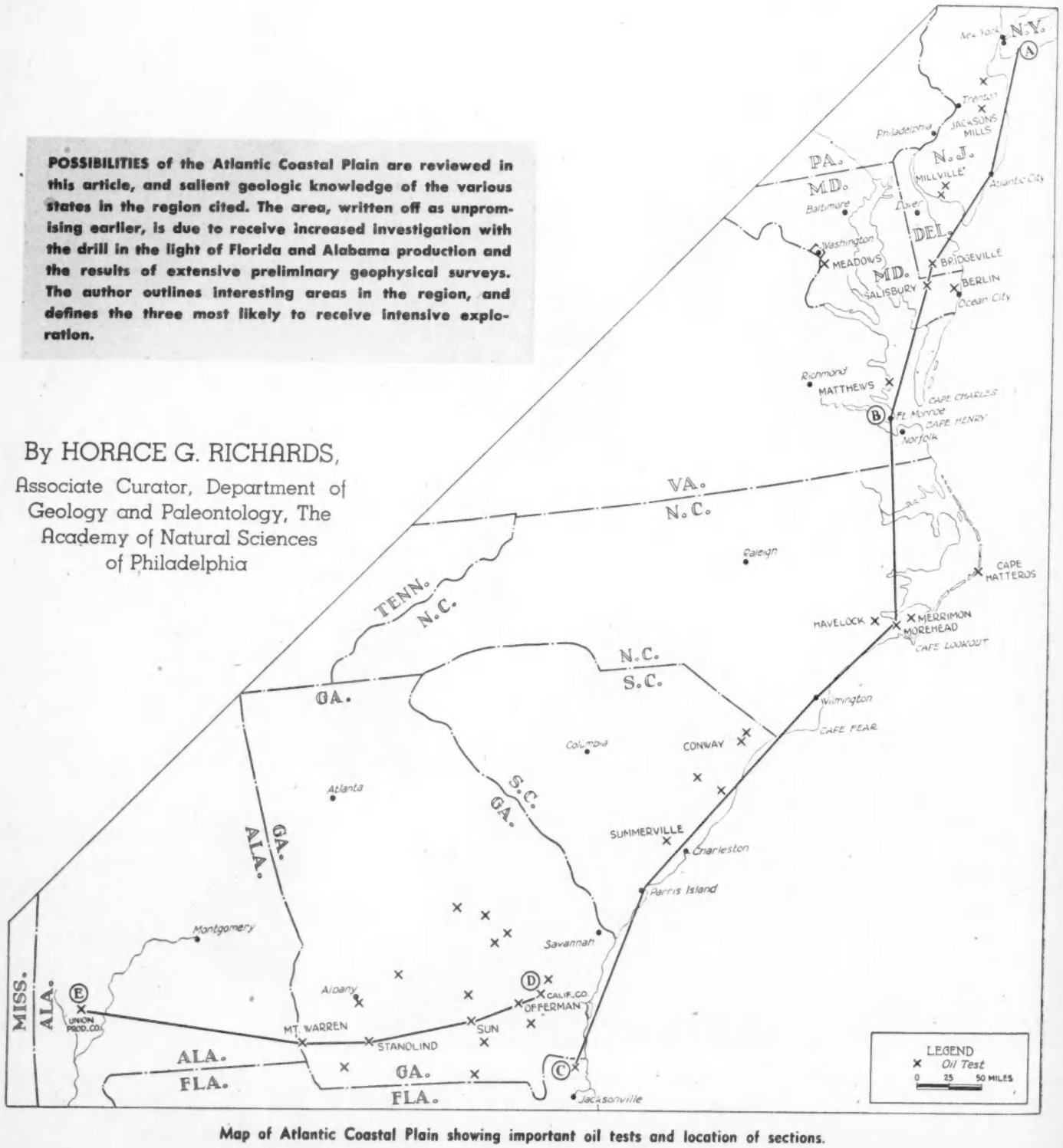
The Atlantic Coastal Plain

ITS GEOLOGY and OIL POSSIBILITIES

POSSIBILITIES of the Atlantic Coastal Plain are reviewed in this article, and salient geologic knowledge of the various states in the region cited. The area, written off as unpromising earlier, is due to receive increased investigation with the drill in the light of Florida and Alabama production and the results of extensive preliminary geophysical surveys. The author outlines interesting areas in the region, and defines the three most likely to receive intensive exploration.

By HORACE G. RICHARDS,
Associate Curator, Department of Geology and Paleontology, The Academy of Natural Sciences of Philadelphia



Map of Atlantic Coastal Plain showing important oil tests and location of sections.

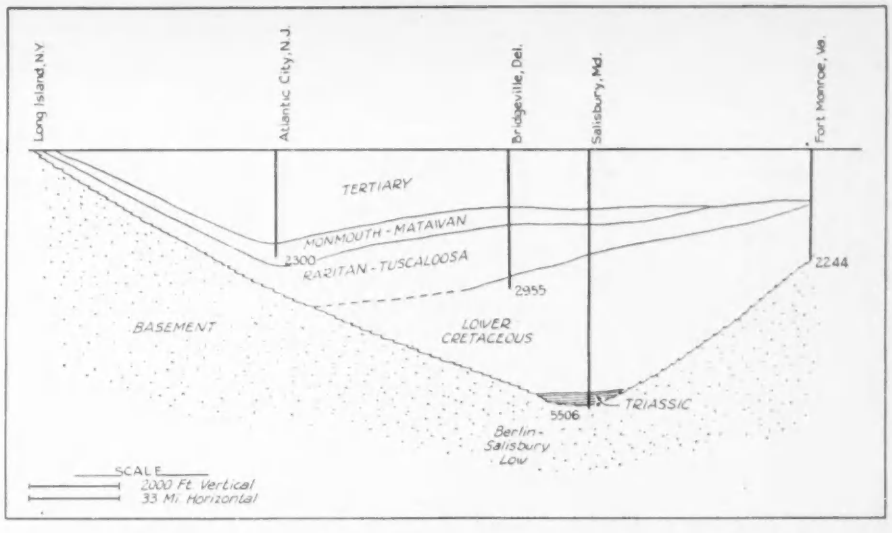
BEFORE World War II very little interest was shown by the oil industry in the geology of the Atlantic Coastal Plain. It was assumed that the sediments were too thin to accumulate any significant supplies of oil, and drilling was largely limited to some half-hearted attempts by local organizations.

The great need for new petroleum supplies brought about by the war caused oil men to look a little more seriously at the East Coast. There was considerable leasing activity all along the coast between New Jersey and Florida, and plans were made for geophysical work and drilling.

The discovery of oil in Florida (Sunniland field in 1943) and Alabama (Gilbertown field in 1944) caused a considerable increase in activity along the East Coast. Since the beginning of the war 3 wells have been drilled in Maryland, 10 in North Carolina, 21 in Georgia, and more than 40 in Florida. In addition, wells are drilling in Georgia and Florida.

Although all these wells except five drilled by Humble Oil & Refining Company in the deep (over 11,000 feet) Sunniland field of Florida have been dry, leasing and field work continues, and plans are under way for additional tests.

Since the Atlantic Coastal plain has only recently come within the interests of the oil industry, it seems appropriate at this time to review some of the highlights of the surface and subsurface geology of this coast—particularly between New Jersey and Georgia—and to call attention to the drilling activity in the region.



Generalized cross-section A-B; Long Island, New York, to Fort Monroe, Virginia.

New Jersey

The Coastal Plain of New Jersey shows little relief. From the "Fall Line" (edge of the Piedmont Plateau) to the Atlantic Ocean can be found formations deposited during most of the major periods of geological time from Basal Upper Cretaceous (Raritan) to late Pleistocene (Cape May) with the exception of the Oligocene. While many of these formations are equivalent to those of the Gulf Coast, it should be noted that they are very much thinner, being measured in terms of feet rather than hundreds or thousands of feet as in Louisiana and Texas. In New Jersey these formations dip gently toward the coast, usually thickening as they approach the present shore line.

Several formations are better represented in the subsurface than in outcrops. For example, various zones of the Kirkwood (Miocene) are recognized in wells at Atlantic City, Cape May, etc., that do not occur on the surface. Also, the outcropping Eocene of New Jersey (Hornerstown, Vincentown, Manasquan and Shark River) is usually regarded as representing only the Middle Eocene (Wilcox and Claiborne), while in the subsurface, late Eocene (Jackson) and earliest Eocene (Midway) faunas have been determined. Furthermore, a well at Salem, N. J., contains deposits tentatively identified as Lower Cretaceous (non-marine), which do not outcrop in the state.

Since there has been very little oil drilling in the state, most knowledge of the subsurface comes from water wells, probably the most important being a test drilled at Atlantic City in 1901, which reached a depth of 2300 feet. It passed through the "800 foot sand" (Miocene), an important water horizon of the coastal towns of New Jersey, and encountered only scant supplies of water to the bottom of the well in the Mount Laurel-Wenonah (Upper Cretaceous).

The basement dips southeastward from its outcrops on Long Island and near Philadelphia, Penn., at the rate of about 65 feet per mile and increasing toward the coast. While no wells have reached basement along the New Jersey coast, geophysical estimates by Woollard and others suggest that it is below 5000 feet at Avalon, 22 miles south of Atlantic City. The maximum thickness of Coastal Plain sediments in New Jersey is probably in the Cape May peninsula where they may be about 6000 feet thick.

Triassic shales and sandstones (Newark series) cross New Jersey from the Highlands to the Delaware River above Trenton. Judging from the fossils, these rocks probably were formed in a fresh water trough or depression. In some places in Monmouth and Middlesex counties the Triassic underlies Coastal Plain sediments, but they have not been found far from their outcrop. Probably this Triassic trough had a connection eastward to the sea, but no trace of this has been found in the subsurface of New Jersey. Perhaps a marine phase of the Triassic will be found deeply buried in southern New Jersey when and if wells are drilled in that region.

No significant tests have been made for oil or gas in New Jersey. In all, about 10 tests have been made, but of these only a few deserve mention.

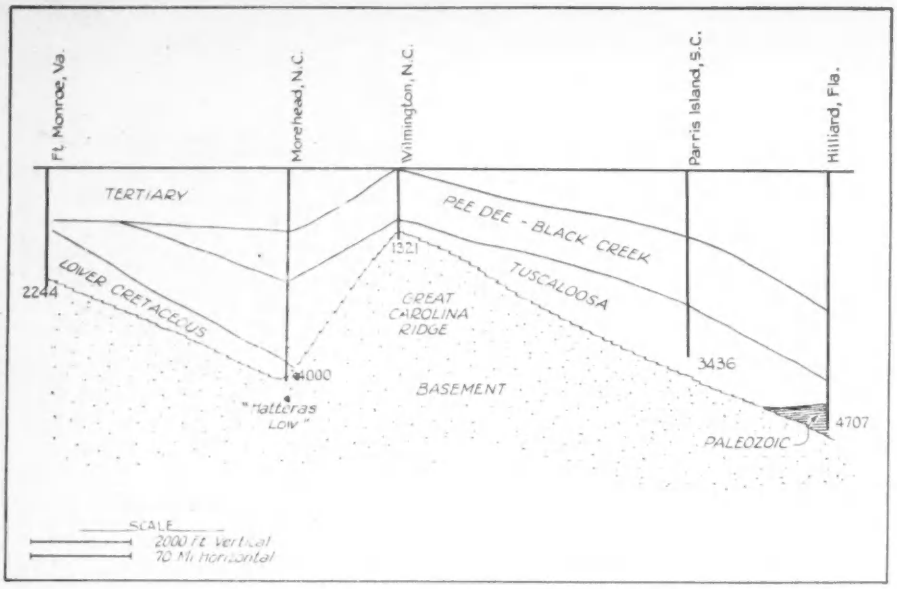
In 1916, the Cumberland Oil and Gas Company drilled to the depth of 705 feet near Millville, Cumberland County. While shows of oil were recorded on the log, these must be regarded with extreme skepticism in the light of later information. Excellent samples were saved, and these have shed important light on the subsurface Miocene of New Jersey. Difficulties with caving and inadequate equipment forced the abandonment at 705 feet.

Two years later (1918) a well was drilled near Newport, Cumberland County, but again caving prevented drilling deeper than 2100 feet. No log or samples are available from this well.

Between 1919 and 1921, several wells were drilled in Ocean County near Prospertown and Jacksons Mills by a local company called New Jersey Oil and Gas Fields Company, later reorganized as the W and K Oil Company. The company apparently took little account of the geology in the Jackson Mills well, for after passing from the Cretaceous to the Wissahickon schist (Pre-Cambrian?) at 1336 feet, drilling continued through the basement to a total depth of 5022 feet. Obviously, no oil was found. Even at this late date, the records are kept secret.

In 1928 another local company was formed, and two shallow wells were drilled near Dunhams Corners in Middlesex County on a supposed fault; neither oil nor gas was found.

Although the Triassic belt is somewhat out of the scope of this paper, it



Generalized cross-section B-C; Fort Monroe, Virginia, to Hilliard, Florida.

should be noted that a 2100-foot well was drilled in 1917 near Belle Meade, Somerset County, and that a much older (1891) 2084-foot well was drilled at Revere, Bucks County, Pennsylvania, just across the Delaware River from New Jersey. No shows were reported.

In 1943, Standard Oil Company of New Jersey proposed drilling a well on a closed structure near Morristown, Morris County, where an oil seepage had been reported, but the plan was abandoned when sufficient leases could not be obtained.

In June, a well was being drilled in the Triassic near Millstone, Somerset County, N. J.

Delaware

The Coastal Plain of Delaware is very flat and the surface deposits consist almost entirely of Pleistocene, older deposits being limited to exposures along the Chesapeake and Delaware Canal and a few local outcrops, notably the Eocene deposits on Noxontown Pond. In the subsurface, the geology is very similar to that of New Jersey except that the Lower Cretaceous (non-marine) is present in several wells, as it is in outcrops in extreme northern Delaware (near Wilmington).

In 1935 a local company drilled a 3000-foot well near Bridgeville, Sussex County. A few shows were reported, but the well was abandoned. In cooperation with Sun Oil Company several additional wells were drilled without confirming the presence of oil or gas. The well is reported to have stopped just below the contact of the Upper and Lower Cretaceous. The well is notable for a section of Eocene thicker than usual and for the presence of marine fossils in the Raritan (basal Upper Cretaceous).

Maryland

The surface geology of Maryland is not very different from that of New Jersey and Delaware. However, there are a number of distinctive features revealed by a study of the subsurface.

1. There is a prominent "low" in the basement which extends inland from the Maryland coast through Berlin and Salisbury to the vicinity of Washington, D. C. All formations thicken in this trough, but the thickening of the Lower Cretaceous is particularly marked. Because of the great thickness of the non-marine Lower Cretaceous in wells at Berlin (± 3400 feet) and Salisbury (± 3000 feet), it is possible that this trough represents an ancient estuary, perhaps the ancestor of Chesapeake Bay or of the Potomac River. On the other hand, this may represent a fault.

Apparently the Lower Cretaceous becomes marine toward the east, and the presence of a few foraminifera fragments in the Berlin well may indicate this; furthermore, marine Lower Cretaceous fossils have been reported from the recent well at Ocean City, Worcester County, Maryland.

2. Another interesting feature shown in the Salisbury and Berlin wells is the presence of Triassic shales and sandstones beneath the Lower Cretaceous and on top of the "basement." These sediments thicken to the seaward and probably represent a downfaulted basin similar to the one that crosses New Jersey and Pennsylvania and to the other basins in Virginia and North Carolina. No evidence of marine fossils has been found in the Triassic in these wells.

3. The Monmouth - Matawan (=Navarro-Taylor) formations thin toward the south, and probably disappear toward the Virginia line. On the other hand, the Raritan (Tuscaloosa) thickens between New Jersey and Maryland and becomes more marine, as shown in the wells at Berlin and Salisbury. However, it becomes thin toward the south between Salisbury and Norfolk and is only 70 feet thick in a well at Norfolk, Va.

Oil Activity

Three shallow oil tests were drilled about the time of World War I. One, at Isle of Wight, Worcester County, was abandoned at 1706 feet in a "mineral water." A well drilled by St. Martins Oil and Gas Company at Parsonsburg, Wicomico County, was still in the Miocene when it was abandoned at 1186 feet. A gas, probably marsh gas, was found at 35 feet.

The third well, drilled one mile south of Meadows, Prince George County, only about six miles from the District of Columbia line, was noteworthy for a 1500-foot section of Lower Cretaceous; the well was abandoned at or near the contact with the Pre-Cambrian at 1506 feet. This indicates a dip of about 125 feet per mile from Pre-Cambrian outcrops in Washington, D. C., and marks the western limit of the trough that extends eastward through Salisbury and Berlin to the coast.

The first significant oil test in Maryland was that of The Ohio Oil Company on the Hammond farm near Salisbury, Wicomico County, drilled in 1944. Basement rock was encountered at 5529 feet, considerably deeper than had been anticipated. The well is noteworthy for (a) the thinning of the Monmouth-Matawan (Navarro - Taylor), (b) the thickening of the marine Raritan-Tuscaloosa, (c) the great thickness (3000 feet) of non-marine Lower Cretaceous, and (d) the presence of the Triassic shales and sandstones between 5360 and 5529 feet. No shows of oil or gas were reported.

The following year Socony-Vacuum Oil Company drilled on the Bethards farm near Berlin, Worcester County, encountering basement at 7157 feet with no shows of gas or oil. All the formations showed a thickening from the Ohio Company well. The presence of a few fragments of foraminifera in deep cores may suggest that the Lower Cretaceous is becoming marine as it extends seaward.

In late 1946 Standard drilled near Ocean City, about nine miles east of the Bethards well. Drilling was halted at 7710 feet, still in the Cretaceous.

Virginia

The Lower Cretaceous is conspicuous over much of the surface of the western Coastal Plain in Virginia, and is also present in wells where it shows a thickness up to at least 800 feet. The Upper

Cretaceous is largely pinched out; the Monmouth-Matawan group is entirely gone, while the Raritan (Tuscaloosa) is limited to a 70-foot thickness in wells near Norfolk. The basal Upper Cretaceous age of this formation is demonstated by the presence of *Exogyra woolmani* related to *E. columella* of the Eagle Ford formation of Texas.

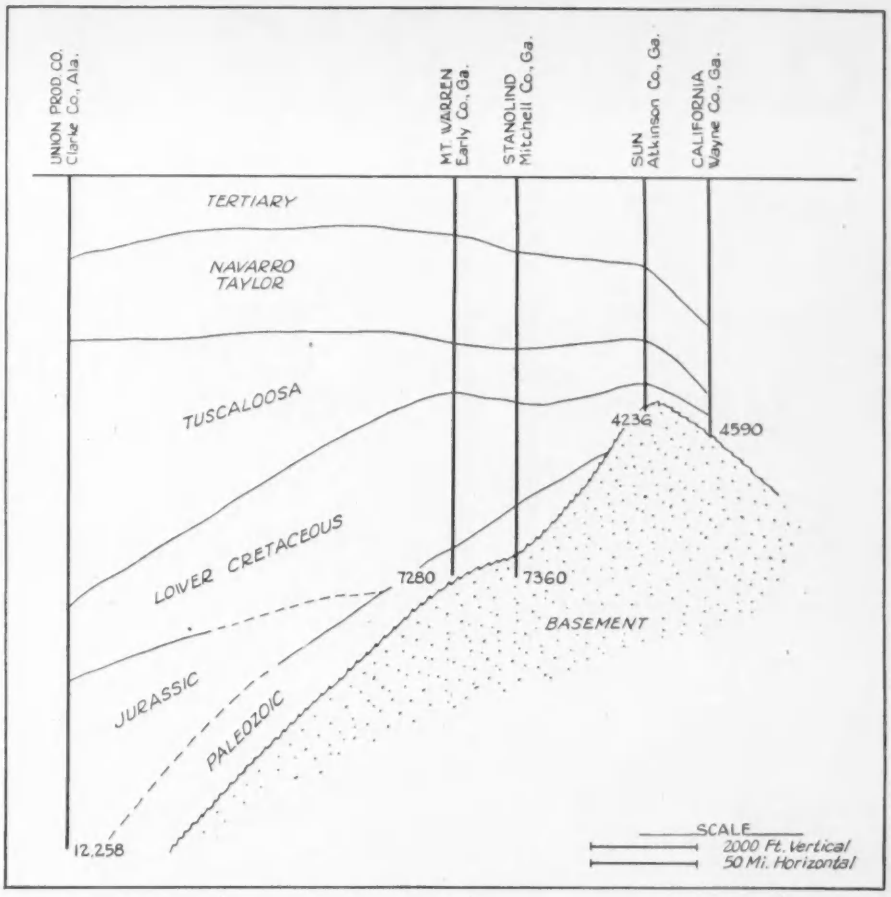
Deposits of Middle Eocene age (Pamunkey group) outcrop over a wide area. In the subsurface, faunas suggesting Early (Midway), Middle (Pamunkey-Claiborne-Wilcox) and Upper (Jackson) Eocene have been recognized. The Eocene is somewhat thicker north of the James River than south of it. According to Cederstrom, this represents a fault. However, additional data from wells in Coastal Virginia are needed to confirm the presence of this fault.

In a well at Norfolk, Va., faunas of Early, Middle and Late Eocene have been recognized even though the entire Eocene is limited to 90 feet.

The Miocene is well developed and overlaps the Piedmont rocks near Petersburg and Richmond.

The basement rocks dips at a rate of about 30 feet per mile from Petersburg to the coast. Beyond this, according to geophysical work of Miller and others, the slope increases so that a point approximately 60 miles at sea the basement may be 12,000 feet deep.

The only oil test in Coastal Plain Virginia was drilled by Elkins Oil and Gas Company in 1929 at Matthews, Matthews County. Traces of gas in the region led to the drilling of the well, but it seems probable that this was merely marsh gas from the Miocene (Yorktown) within 100 feet of the surface. Basement was encountered at 2307 feet. A water well at Fort Monroe reached basement at 2246 feet. These two figures suggest a rise in the basement from the trough near Berlin and Salisbury, Maryland.



Generalized cross-section D-E; Wayne County, Georgia, to Clarke County, Alabama.

North Carolina

The region between the Virginia Capes and Cape Hatteras is the biggest question mark, geologically speaking, along the East Coast.

The basement drops decidedly between Fort Monroe (2246 feet) and Hatteras (9878 feet). However, the north-south slope is not as great as might be indicated since Hatteras is well out to sea, and, as noted under the discussion of Virginia, the basement slope increases east of Norfolk. If we were to contrast Fort Monroe (2246 feet) with Havelock, N. C. (2318 feet) or Morehead City, N. C. (4036 feet), the slope would not be as great.

In any case, the basement and all higher formations rise sharply near Cape Fear. This rise is one of the most conspicuous structural features of the East Coast and is called the Great Carolina Ridge or the Cape Fear Arch. At Wilmington, basement rises to a depth of only 1109 feet and then drops off again toward South Carolina.

That the basement is not smooth in North Carolina is clearly shown at Fountain, Pitt County, where there is a conspicuous granite "hill" that extends to the surface, whereas both east and west of the town it is buried to a depth of about 200 feet.

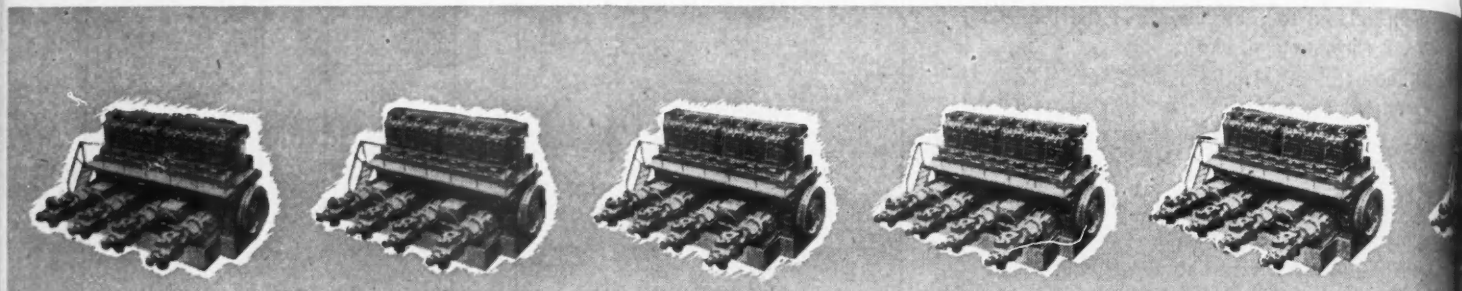
The basement slopes rather gently (average 10 feet per mile) from the Fall Line toward the coast. From Beaufort eastward the slope increases considerably, dropping almost 6000 feet in the 65 miles between Beaufort and a line with Cape Hatteras. Whether this slope increases at Havelock or Morehead is not clear. The Havelock well is reported to have struck basement at 2318 feet, while the Karsten well near Morehard, only 17 miles away, did not reach it until 4036 feet. This might be taken as an indication of a dip of 150 feet per mile. On the other hand, Havelock may represent a "high" in the basement similar to the one at Fountain, while the Karsten well may be on the normal slope. Several recent wells near Merriman in Cartaret County reached basement at about 4000 feet.

It is very difficult, or impossible, to separate the basal Upper Cretaceous (Tuscaloosa) and Lower Cretaceous (Potomac) near the Virginia-North Carolina line. It is probable that much of the so-called "Tuscaloosa" of northeastern North Carolina is made up of sediments of both Lower and Upper Cretaceous age. In any case, both the Tuscaloosa and Lower Cretaceous thicken and become more marine toward the coast. Marine Tuscaloosa (Upper Cretaceous) fossils are present in wells at Havelock, Craven County (2125-2318 feet), and Morehead (2263-4036 feet), and both Tuscaloosa and Lower Cretaceous fossils have been reported from the Standard well at Hatteras.

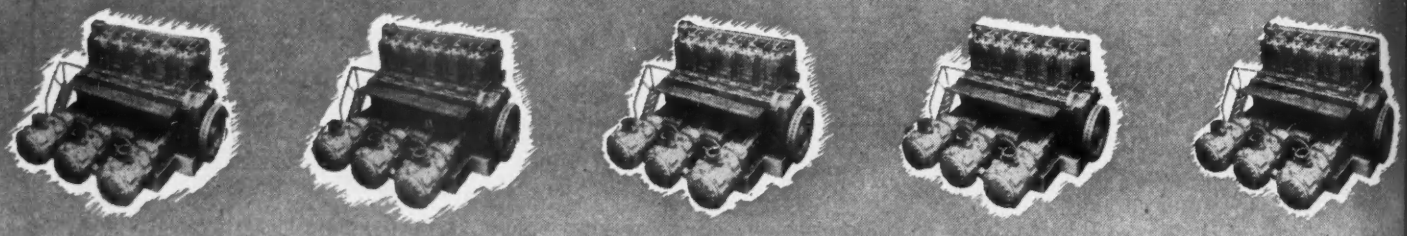
Peedee (Navarro) and Black Creek (Taylor) occur in outcrops and in the subsurface, particularly south of the Neuse River. They pinch out toward the north and again toward the Cape Fear Arch in the South.

The Eocene also shows some peculiarities in North Carolina. The Middle Eocene becomes very thin and practically pinches out near the Virginia-North Carolina line. The only definite Middle Eocene reported from North Carolina consists of thin layers in a few wells in northeastern North Carolina

CLARK "BIG ANGLES"



AT EUNICE, NEW MEXICO—11 CLARK 6 CYL.



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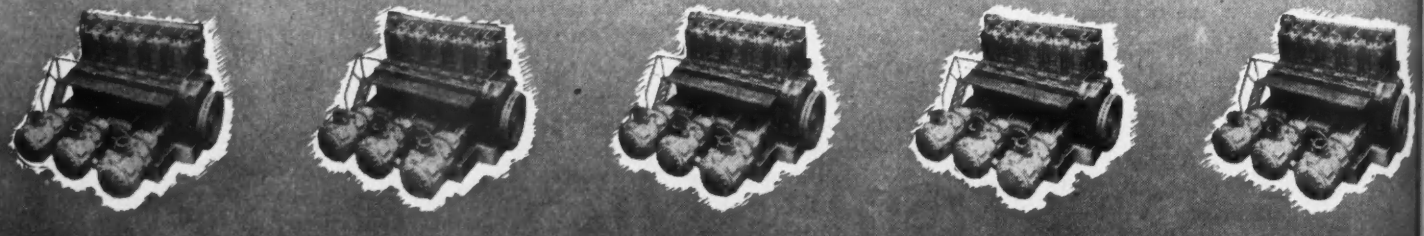

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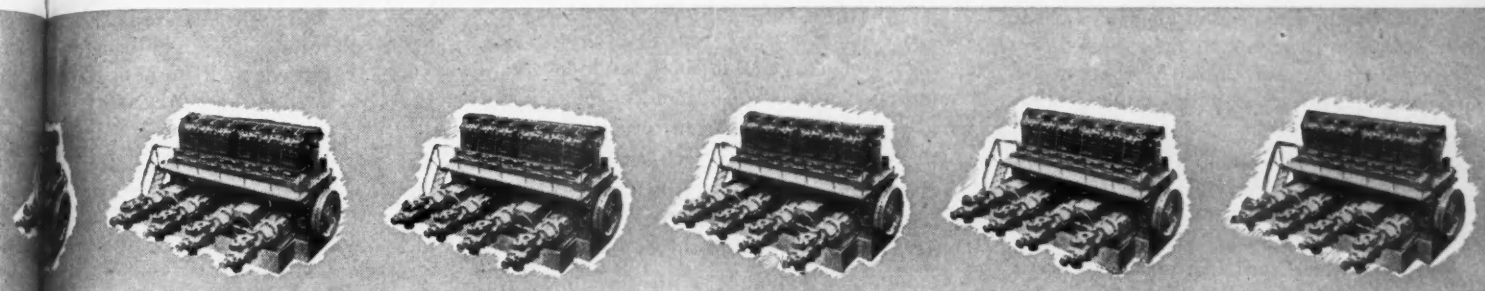

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(for example Williamston, Martin County) and some outcrops of hard quartzite far above the Fall Line near Raleigh. Upper Eocene limestone (Castle Hayne-Jackson) is present in outcrops and wells south of the Neuse River and in the Cape Hatteras well. The Castle Hayne is arched upward in the Cape Fear region, and then drops again into South Carolina where it becomes the Santee and Cooper formations.

Lithologically, it is very difficult to separate the Castle Hayne from the overlying Trent. Both are limestones, and the faunas usually are poorly preserved. When sufficient fossils do occur, the Trent is shown to be of Lower Miocene age, equivalent to the Tampa of Florida. The Trent occurs only in extreme eastern North Carolina. It is very local and represents only a slight advance of the sea in the Hatteras region. Both north and south, the land was above water during the Early Miocene.

Later Miocene deposits (Yorktown-Duplin) are present in eastern North Carolina and carry a rich fauna, indicating a relatively shallow water. A deepening of this water is suggested by the Miocene deposits in the Hatteras well.

Thin deposits of marine Pliocene (Waccamaw-Croatan) are also known from eastern North Carolina, marking the farthest north that the Pliocene sea advanced over the present land.

Oil Activity

In 1924 the Great Lakes Company was formed and a well drilled near Havelock, Craven County. The contractor reported a small show of gas between 720 and 725 feet, but the well was abandoned at 2351 feet, presumably in granite.

A few years later the Pamlico Oil Company was formed and some prospecting was done near Oriental, Pamlico County, but as far as can be learned, no actual drilling was attempted.

Other oil tests about which very little information is available include three shallow wells near Water Lily, Currituck County (drilled 1921, maximum depth 835 feet) and a shallow test near Clinton, Sampson County (1927).

With the increase in activity along the East Coast, the state of North Carolina, through the Board of Conservation and Development and the Board of Education divided state-owned land into three sections. All state-controlled lands and public water bodies east of the 77th meridian and north of a line drawn from the intersection of the 77th meridian east of Washington to the tip of Cape Hatteras were leased to Standard Oil Company of New Jersey. Furthermore, state-owned lands and public water bodies south of a line drawn due west from the center of Ocracoke Inlet were leased to the Coastal Plains Company, a local organization. The part between was retained by the state.

The Coastal Plains Company, reorganized as Tidewater Petroleum and Gas Company, drilled near Morehead City (Karsten Well) in 1945, and encountered basement at 4036 feet, somewhat deeper than had been anticipated on the basis of the Havelock well.

After about a year of geophysical surveys, Standard started drilling at Cape Hatteras in February, 1946. This well was admittedly mainly a stratigraphic test drilled as far east as possible to get the thickest section. It was completed in July, 1946, at the depth of 10,054 feet, basement having been reached at 9878 feet, considerably deeper than had been anticipated from the seismic studies.

As would be expected, all formations show a thickening and the faunas usually suggest slightly more marine conditions than in wells or outcrops farther inland. Since the material is now being studied, it is not possible to discuss fully the stratigraphy of the Hatteras well at this time. The great thickness (4090-9978 feet) of undifferentiated Tuscaloosa and Lower Cretaceous sediments with marine fossils is of considerable interest. According to Standard, no shows whatever of oil or gas were encountered.

In early 1947 Standard drilled to 6329 feet in Pamlico Sound. The well, drilled in five feet of water, was abandoned while still in the Cretaceous.

The Carolina Petroleum Company, by arrangements with the Coastal Plains Company, has undertaken the drilling of several more wells in Cartaret County. Five were completed during 1946: Guy Carraway (4072 feet), Nita Carraway (4126 feet), Phillips-State (3944 feet), H. B. Salter (3963 feet), and John Wallace (4024 feet), all near Merrimon. Although newspaper reports mentioned shows of gas, they are not thought to have been of commercial value.

Two additional wells were drilled by this company in Pamlico County during early 1947.

South Carolina

The surface geology of South Carolina is not very different from that of North Carolina except that Oligocene sediments (Flint River) are present near the Savannah River. These are not known north of this point.

Basement drops off to the south from the Carolina Ridge and the various overlying formations thicken accordingly. The Tuscaloosa is non-marine in outcrop and carries a characteristic flora. However, the seaward phases are marine as shown in wells near Conway and Parris Island.

Logs of two wells, Florence at Summerville, report the presence of Triassic sediments under the Cretaceous and on top of the basement. These may indicate another downfaulted area similar to that under Salisbury, Md. Since no samples are available, the existence of this basin must still be regarded as hypothetical, although geophysical work of McCarthy lends some support to the theory.

In 1937 a dry hole was drilled near Summerville, Dorchester County, which passed through a hard layer (1580-2470) identified as Triassic by some workers and as Cretaceous by others.

In 1939 several oil tests were drilled by independent companies on the southern flank of the Carolina Ridge in Horry, Georgetown and Williamsburg counties. In all cases basement was struck at less than 1500 feet. No oil or gas was found, although at the time there were reports of oil or gas in the soil not far below the surface.

Although not an oil well, the deep water well (3454 feet) at the U. S. Marine Base at Parris Island has given important information on the stratigraphy of the region. An electric log was made of this well.

Georgia

Since the geology and oil prospects of Georgia have been discussed by Captain Garland Peyton,[1] they will be only briefly summarized here.

1. All major formations from Basal Upper Cretaceous (Tuscaloosa) to Pleistocene outcrop in the state.

2. The basement continues to dip southward along the coast, as shown by wells at Summerville, S. C. (2470 feet), Parris Island, S. C. (3434+ feet), Offerman, Ga. (4335 feet) and Hilliard, Florida (4817 feet).

3. However, there is a more conspicuous deepening of the basement toward the southwest. The basement is 4220 feet deep in the Sun well near Pearson, Atkinson County, Ga., and drops off to the east as shown by the California Company well near McKinnon, Wayne County, Ga., where it is encountered at 4620 feet. Basement also drops off toward the west as shown in the Stanolind well near Camilla in Mitchell County (7330 feet) and the Mont Warren well near Cedar Springs in Early County (7240 feet). Basement apparently continues to dip to the westward, and was not reached in the well of the Union Producing Company in Clarke County, Alabama (12,398 feet). This may represent a geosyncline separated from the open ocean by the ridge in the Atkinson County well.

4. The Tuscaloosa is more dominantly

■ CONTINUED ON PAGE 58

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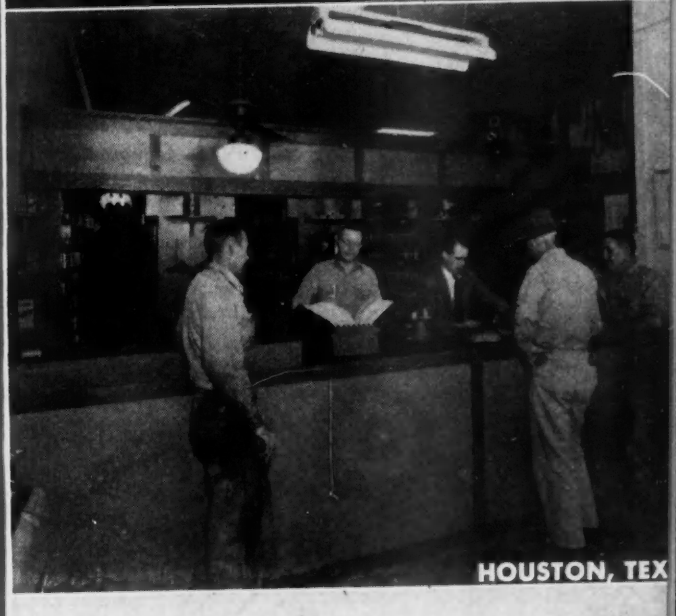

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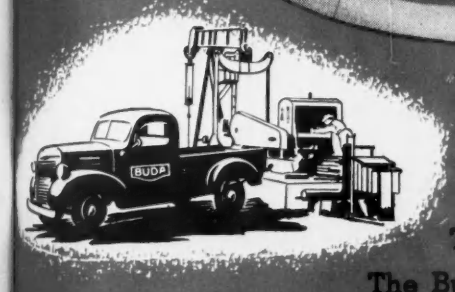

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Consultant

Condensate PRODUCTION AND CYCLING

Part 6

Condensate Recovery for Several Wells

A GENERAL procedure for mapping cycling programs is discussed in this article aside from variation in plant extraction efficiency with composition of production. The procedure is based on the assumption that the load placed on a well does not exceed its producing, or injection, capacity. The load on a well varies with its location. An overloaded well causes a quicker breakthrough of gas. The capacity of wells will be considered in later articles.

Several Wells in One Interval

Consider several injection and producing wells completed in one interval. Let G_i be the in place rich gas allocated to the ith well. Let $G_i = 1$ be the basis for expressing the cumulative gas production. Then unity also represents the acre-feet of pay and the butanes-plus initially in place on a per-well basis. As the wells are producing from a given interval, the composition of production is equal to unity until dry gas appears in production. After breakthrough, the composition of the production from the ith well declines progressively.

Assume that each producing well together with the invadable acre-feet allocated thereto is a unit by itself. Map out the composition and cumulative liquid recovery in terms of the cumulative gas production from each unit. Thus, the composition X_i for the production from the ith well (see Part 5) is defined by

$$X_i = e^{-(V_i - b_i m_i) / (1 - b_i m_i)} \qquad (1)$$

and the cumulative liquid recovery C_i, by

$$C_i = 1 - (1 - b_i m_i) X_i \qquad (2)$$

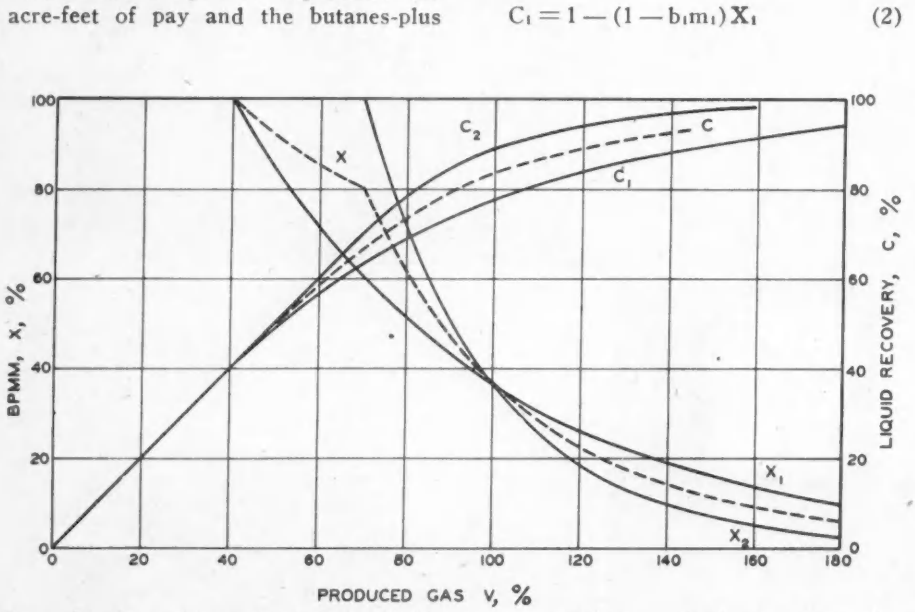

Figure 6-1. Composition and cumulative liquid recovery vs. total gas production from two wells; solid curves on a per well basis; dashed curves for wells (1) and (2) combined; per-well gas producing rate proportional to initially in place rich gas.

where $b_i m_i$ is the per-well breakthrough recovery and V_i is the per-well produced gas. The breakthrough recovery and the cumulative gas production are expressed in terms of G_i.

The solid curves in Figure 6-1 are solutions of equations (1) and (2) for two wells. The breakthrough recovery for well (1) is 40 percent of the rich gas allocated to well (1). The breakthrough recovery from well (2) is 70 percent of the rich gas allocated to well (2).

Gas Rate Proportional to In Place Gas

Suppose there are N wells and each well produces gas at a rate which is proportional to the per-well rich gas initially in place. For this condition, the cumulative gas production V, expressed in terms of the total rich gas initially in place, equals V_i, the cumulative gas production from the individual wells expressed in terms of the rich gas initially in place on a per-well basis. When gas producing rate is proportional to in place rich gas, the ratio V/V_i equals unity. There is no change in the position of either composition or cumulative liquid recovery as between a map based on one well and a map based on N wells.

However, the contribution to composition and cumulative liquid recovery by the ith well is proportional to G_i, the rich gas allocated to the ith well. Let W_i be the contribution to composition by the ith well. Then for any value of $V = V_i$, we have

$$W_i = X_i \frac{G_i}{\Sigma G_i} \qquad (3)$$

Let B_i be the contribution to cumulative liquid recovery. Then for any value of $V = V_i$

$$B_i = C_i \frac{G_i}{\Sigma G_i} \qquad (4)$$

The composition X of the production from N wells is defined by

$$X = \Sigma W_i = \Sigma \left[\frac{X_i G_i}{\Sigma G_i} \right] \quad (5)$$

The cumulative liquid recovery C is given by

$$C = \Sigma B_i = \Sigma \left[\frac{C_i G_i}{\Sigma G_i} \right] \quad (6)$$

In the special case where the volume of rich gas initially in place on a per-well basis is the same for all wells, G_i equals 1/N. So

$$X = \frac{\Sigma X_i}{N} \quad (7)$$

and

$$C = \frac{\Sigma C_i}{N} \quad (8)$$

where N is the number of wells. The dashed curves in Figure 6-1 are solutions of equations (7) and (8) for two wells. The X_1 and X_2 compositions and the C_1 and C_2 cumulative liquid recoveries were combined in the proportion of 1:1.

Suppose the ratio G_1/G_2 were 2:1. By equation (3), the contribution to composition would be

$$W_1 = 2X_1/3 \text{ and } W_2 = X_2/3$$

By equation (4), the contribution to cumulative liquid recovery would be

$$B_1 = 2C_1/3 \text{ and } B_2 = C_2/3$$

The composition of the production from both wells is given by

$$X = \frac{1}{3}[2X_1 + X_2]$$

and the cumulative liquid recovery by

$$C = \frac{1}{3}[2C_1 + C_2]$$

The curves in Figure 6-2 are solutions of the foregoing expressions. The curves W_1 and W_2 show the contribution to composition from wells (1) and (2) respectively. The curves B_1 and B_2 show the contribution to cumulative liquid recovery from wells (1) and (2) respectively. The curves X and C are the composition and liquid recovery from wells (1) and (2) combined in a 2:1 proportion.

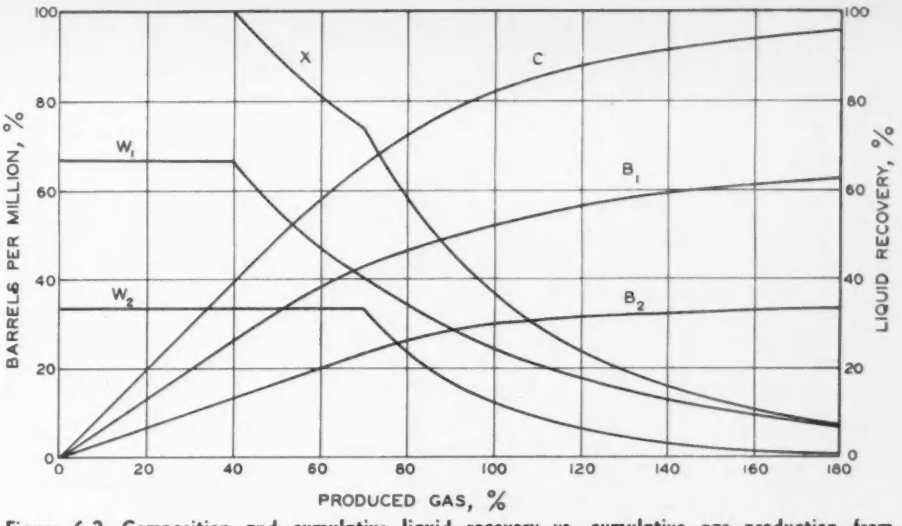

Figure 6-2. Composition and cumulative liquid recovery vs. cumulative gas production from wells (1) and (2) and for wells (1) and (2) combined in the proportion of 2:1; producing rate is proportional to initially in place rich gas.

One Well in Several Intervals

Most rich gas reservoirs have several pay intervals. The permeability, the pay thickness in which wells are completed and the rich gas allocated to a well are not uniform as between intervals for one well and as between two or more wells completed in a given reservoir. A procedure will now be considered for estimating the composition of production and cumulative liquid recovery in the following order: First, one well producing from several intervals; next, several wells producing from one reservoir, each well being completed in several intervals.

The first step is to map out the producing characteristics by intervals by wells. For instance, if there were four producing wells and each well were completed in three intervals, there would be twelve maps. Figure 6-3 illustrates two per-interval maps for one well. The well is producing from two intervals. The per-interval breakthrough recoveries are 60 and 80 percent of the per-interval rich gas allocated to the well. The composition and cumulative liquid recovery on the per-interval basis will now be combined in order to obtain the composition and cumulative liquid recovery in terms of the cumulative gas production from the well.

Let K_i equal permeability and h_i, the feet of completion for a well in the ith interval. Let Q be a uniform annual rate of gas production from a well. Then the volume of produced gas V, expressed as a fraction of the rich gas initially in place, is given by

$$V = \frac{yQ}{\Sigma G_i}$$

where y is time in years, G_i is per-interval in place gas and ΣG_i is the total in place gas.

Let the rate of gas production Q_i from the ith interval be proportional to $(hK)_i$. Then

$$Q_i = \frac{(hK)_i}{\Sigma (hK)_i} Q$$

The volume of gas V_i accumulated from the ith interval at the time y is defined by

$$V_i = \frac{yQ_i}{G_i}$$

where V_i is a fraction of G_i. Therefore,

$$V = V_i \frac{G_i}{\Sigma G_i} \cdot \frac{\Sigma (hK)_i}{(hK)_i} \quad (9)$$

Suppose the structure and stratigraphy for the two intervals in Figure 6-3 are such that the following conditions obtain:

Interval	1	2
Breakthrough, percent	60	80
Relative gas in place	1.2	1.0
Completion in pay, feet	14	12
Permeability, millidarcys	800	400

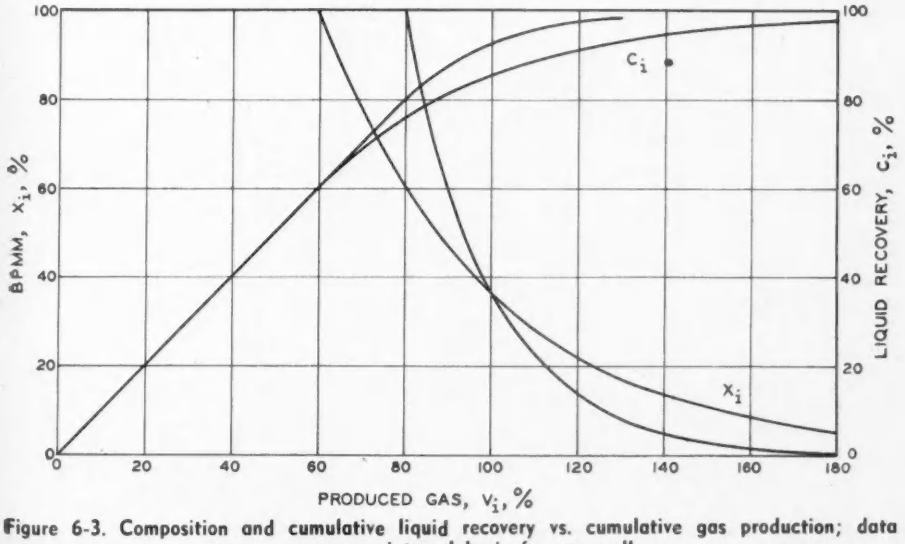

Figure 6-3. Composition and cumulative liquid recovery vs. cumulative gas production; data are on a per-interval basis for one well.

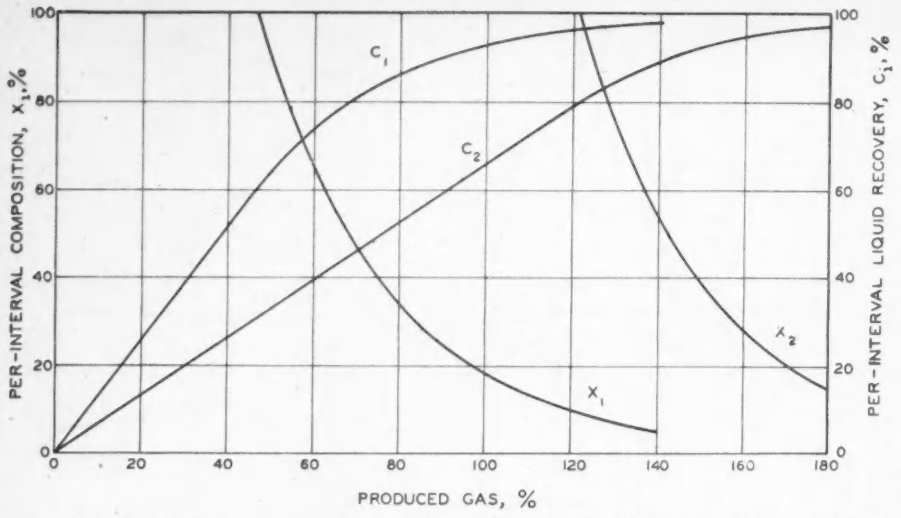

Figure 6-4. Composition and cumulative liquid recovery on a per-interval basis vs. produced gas in percent of the total rich gas in place.

By equation (9), the relationship in this example between cumulative produced gas on a per-interval basis V_i and on a per-well basis V is given by

$$V = 0.78V_1 = 1.52V_2$$

The curves in Figure 6-4 are solutions of the foregoing expression. Dry gas breaks through in the most permeable interval when produced gas is 46.8 percent of the total rich gas initially in place. Dry gas breaks through in the less permeable interval when produced gas is 121.6 percent of the total rich gas initially in place. The X_i and C_i curves are composition and cumulative liquid recovery on per-interval basis. These data are plotted against V, the cumulative gas production from the two intervals combined.

The per-interval contributions to liquid recovery and composition for the production from a well are obtained in the following manner. At the time the gas produced from a well is V, the per-interval produced gas is V_i. The liquid recovery is C_i. So the per-interval contribution to cumulative liquid recovery B_i is defined by

$$B_i = C_i \frac{G_i}{\Sigma G_i} \qquad (10)$$

On the other hand, the per-interval contribution to composition is proportional to the per-interval producing rate. At the time the gas produced from a well is V, the per-interval produced gas is V_i and the composition is X_i. So the per-interval contribution to composition W_i is defined by

$$W_i = X_i \frac{(hK)_i}{\Sigma(hK)_i} \qquad (11)$$

For the data in Figure 6-4, we have

$$B_1 = 0.545C_1 \text{ and } B_2 = 0.455C_2$$

and

$$W_1 = 0.7X_1 \text{ and } W_2 = 0.3X_2$$

Solutions of the foregoing expressions for the well producing from two intervals are given in Figure 6-5. The permeability of interval (1) is 800 and of interval (2), 400 millidarcys. Dry gas reaches the producing well via the more permeable interval when the produced gas is 46.8 percent. The gas producing rate from this interval is 70 percent of the total rate. After breakthrough, the liquid content in the gas from the 800-mds. interval is given by the W_1 curve, which is in percent of the liquid content in the production from both intervals.

Dry gas breaks through in the 400-mds. interval when the total produced gas is 121.6 percent. The gas producing rate from this interval is 30 percent of the total rate. After breakthrough, the liquid content in the gas from the 400-mds. interval is given by the W_2 curve.

The sum of the W_1 and W_2 curves gives X, the composition from the well. The B_1 and B_2 curves show the liquid recovery. The sum of these curves gives C, the cumulative liquid recovery from the well.

For a 10 percent economic limit, the cumulative liquid recovery would be about 97 percent of the liquid initially in place in the rich gas. The corresponding volume of produced gas is almost 1.6 times the rich gas initially in place.

For a 50 percent economic limit, the cumulative liquid recovery would be about 74 percent. The contribution to liquid recovery is 48 percent from the 800-mds. interval and 26 percent from less permeable interval. The produced gas is about 86 percent.

Based on a uniform 10 percent per year gas producing rate and a uniform plant extraction efficiency, the life of a cycling project would be 8.6 years to recover 74 percent of the liquid and an additional 7.4 years to recover an additional 23 percent of liquid. The annual rate of gross income from liquid sales during the 7.4 years averages 36 percent of the corresponding value during the first 8.6 years. Evidently, there is no profit in producing dry gas.

Several Wells and Intervals

Consider several wells producing from a reservoir which has several intervals. Each well is completed in several intervals. The completion in pay, permeability and rich gas initially in place on a per-interval basis for one well are not uniform. The completion in pay, permeability and rich gas initially in place as between wells are not uniform either. However, the wells are produced from a common reservoir so the per-well composition is uniform until dry gas appears in production.

The produced gas, liquid recovery and composition on a per-well basis are obtained by the methods already considered. For instance, the X and C curves in Figure 6-5 could be the producing

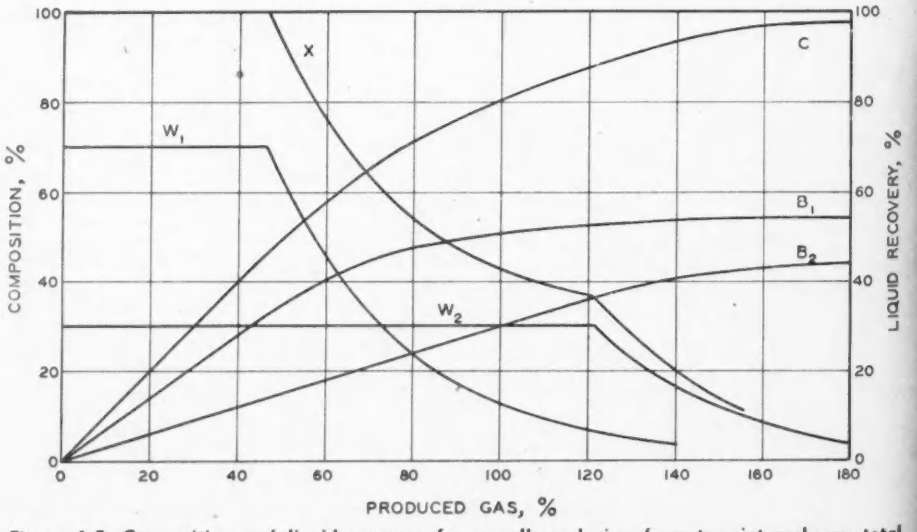

Figure 6-5. Composition and liquid recovery for a well producing from two intervals vs. total produced gas.

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characteristics for one well. The data are in terms of the rich gas allocated to one well. Denote liquid recovery and composition on a one-well basis by C_i and X_i where C_i and X_i are in terms of V_i, the gas produced from the ith well, and V_i is in terms of G_i, the rich gas allocated to the ith well. We wish to estimate composition and liquid recovery in terms of V the gas produced from a reservoir, where V is expressed in terms of ΣG_i, the total volume of rich gas initially within a reservoir.

If the porosity, interstitial water and composition of in place rich gas are uniform as between intervals for a given well and as between wells for a given reservoir, the rich gas allocated to a well is proportional to the acre-feet of pay allocated to the well. Let $(aH)_i$ be the product of the acres and average pay thickness allocated to the ith well. Then

$$\frac{G_i}{\Sigma G_i} = \frac{(aH)_i}{\Sigma (aH)_i} \qquad (12)$$

Equation (12) is valid only if the invadable acre-feet is 100 percent of the acre-feet of pay allocated to a well. Invadable acre-feet of pay is aside from economic limits as to the composition of production. When the location of injection and producing wells are such that dry gas can invade only a fraction of the acre-feet allocated to some wells, it is understood that G_i is the rich gas in place within the invadable region and $(aH)_i$ is the invadable acre-feet of pay.

Consider N wells producing from a reservoir. Let Q be a uniform annual rate of gas production from the reservoir. Then the produced gas V expressed as a fraction of the rich gas initially in place is given by

$$V = \frac{yQ}{\Sigma G_i}$$

where y is time in years and G_i is per-well in place gas.

Let Q_i be a uniform annual rate of gas production from the ith well. Then the produced gas V_i, expressed as a fraction of the rich gas G_i within the invadable acre-feet allocated to the ith well, is defined by

$$V_i = \frac{yQ_i}{G_i}$$

Therefore, the relationship between V and V_i is defined by

$$V = V_i \frac{G_i}{\Sigma G_i} \cdot \frac{Q}{Q_i} \qquad (13)$$

As an illustrative application of equation (13), consider the following conditions for three wells producing from a reservoir:

Well number	1	2	3
Billion feet per well	20	25	30
Million feet/day/well	7	8	10

By equation (13), we have

$$V = 0.953V_1 = 1.04V_2 = 1.00V_3$$

which is an almost perfect cycling program with respect to per-well producing rates. Evidently, per-well producing rates should be proportional to per-well rich gas in place, that is V/V_i should approach unity. Otherwise, dry gas breaks through into some well earlier in the life of a cycling program. For the same reason, per-interval producing rates should be proportional to per-interval rich gas in place.

At the time the gas produced from a reservoir is V, the per-well produced gas is V_i and liquid recovery is C_i. So the per-well contribution to cumulative liquid recovery B_i is defined by equation (4).

At the time the gas produced from a reservoir is V, the per-well produced gas is V_i. So the per-well contribution to composition W_i is defined by

$$W_i = X_i \frac{Q_i}{Q} \qquad (14)$$

Summary

Liquid recovery and composition for injection of dry gas into rich gas may be estimated as follows: Plot C_i and X_i against V_i for each interval and each producing well. Convert from the per-interval basis to per-well basis for each well. Then combine the per-well data to get on a per-reservoir basis. Make the ratio V/V_i as between intervals for a well approach unity insofar as possible. Then make the ratio V/V_i as between wells for a reservoir approach unity insofar as possible. Finally, compare the producing, or injection, load on each well with the producing, or injection, capacity of each well.

The Atlantic Coastal Plain

• CONTINUED FROM PAGE 50

marine in this "basin" as shown by the Sealy No. 1 well in Doughtery County where marine fossils were found between 2800 and 5013 feet, and similarly in the recent well of the Kerr-McGee Company in Crisp County.

5. Non-marine Lower Cretaceous underlies the Tuscaloosa in wells in this basin, thickening toward the west.

6. Marine Jurassic has been recognized in the Clarke County, Alabama, well between 9466 and 12,398 feet (TD). This apparently pinches out toward the east, but may underlie southwestern Georgia.

7. Paleozoic shale underlies the Cretaceous in the Mont Warren well 6975 feet and possibly in the Pullen well (6320 feet). The Paleozoic apparently rises toward the south for it has been reported at about —4000 feet in Madison and Lafayette Counties, Florida. It is possible that this ridge has some connection with the Ocala uplift.

Oil Activity

This subject has been discussed in Captain Peyton's article. Suffice it to say at this time that 41 oil tests have been drilled in the Coastal Plain of Georgia, of which 27 were between 1938 and 1946. None have yielded oil or gas in commercial quantities. Most of the drilling has been done by local or independent companies, although several of the majors, including Sun, Stanolind and the California Company, have also drilled dry holes in Georgia.

Conclusion

It is not the purpose of this paper to recommend suitable places for future oil drilling. The available information has been presented, and the recent drilling activity reported. Even though these tests so far have proved unsuccessful, it must not be assumed that the East Coast should be written off as unprofitable. The continuing activity of several companies in this area shows that there is still definite hope of finding oil. The major activity seems to center in three areas.

1. The Salisbury-Berlin depression in Maryland. The unexpected thickness of the Coastal Plain sediments has led to the hope that some oil might be found. This trough may extend north into Delaware and possibly southern New Jersey. The predominantly non-marine character of the sediments, especially Lower Cretaceous, may however be a discouraging feature in this area.

2. Eastern North Carolina. Here again considerable thicknesses are found, and unlike the Maryland basin, the sediments are largely marine.

3. Southwestern Georgia. There appears to be a basin in southwestern Georgia west of the basement of Paleozoic ridge shown in the Sun well in Atkinson County. Sediments drop off toward the west, and it is thought possible that some oil may be found in this basin.

On the other hand there are some indications that the Coastal Plain sediments along the East Coast are too thin, or represent too shallow water, and that oil, if present, is in sediments beneath the bottom of the sea. It is known that the Coastal Plain sediments thicken rapidly to the seaward, and it is possible that 30 miles or more out to sea thicknesses will be found similar to those along the Gulf Coast.

At the present time drilling 30 miles out in the Atlantic is purely in the speculative stage, but who knows but that one of the future oil fields of the U. S. will be under the ocean off the seaward extension of the Atlantic Coastal Plain?

REFERENCE

[1]Oil Weekly, Vol. 123, No. 3, pp. 92-96, September 16, 1946.

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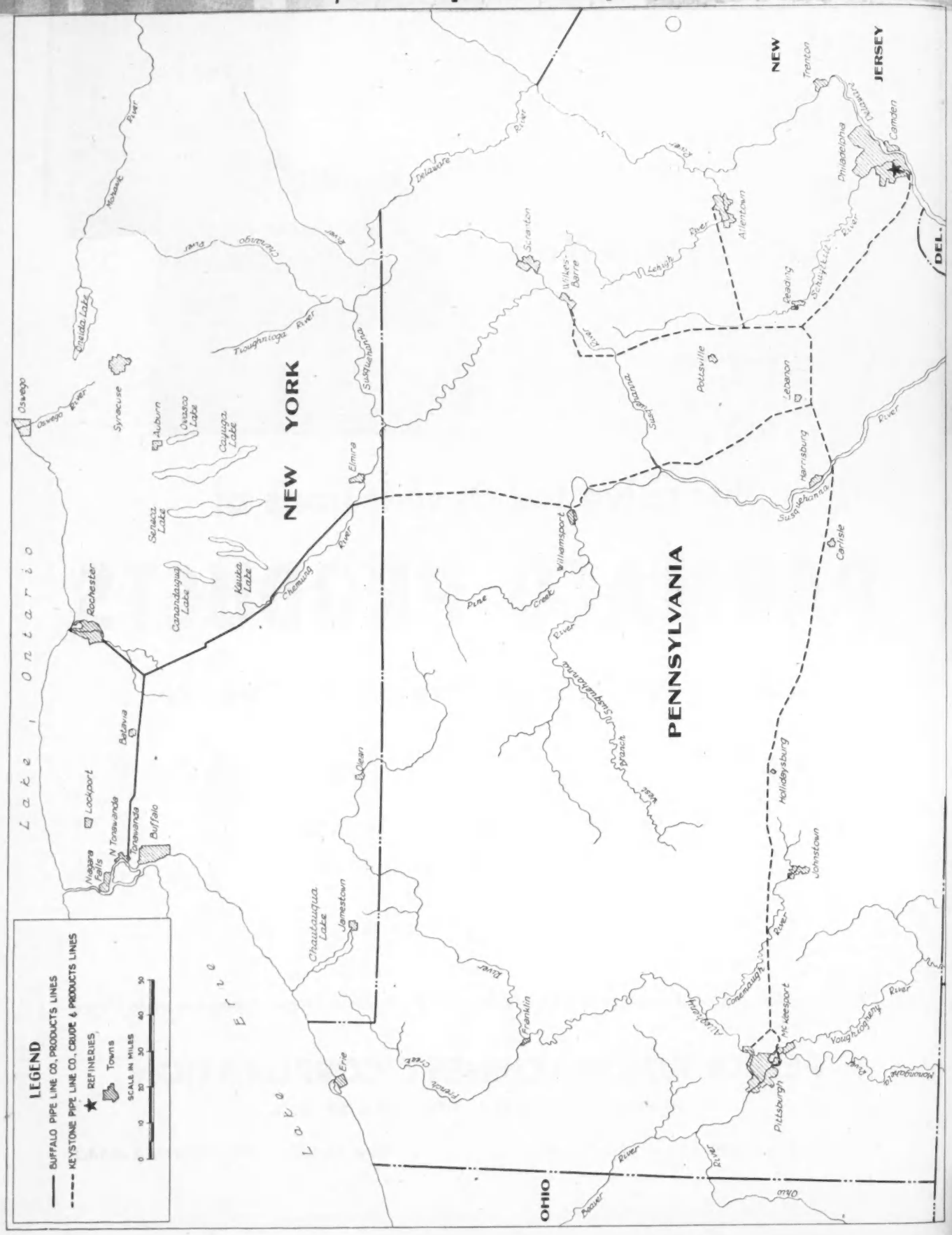

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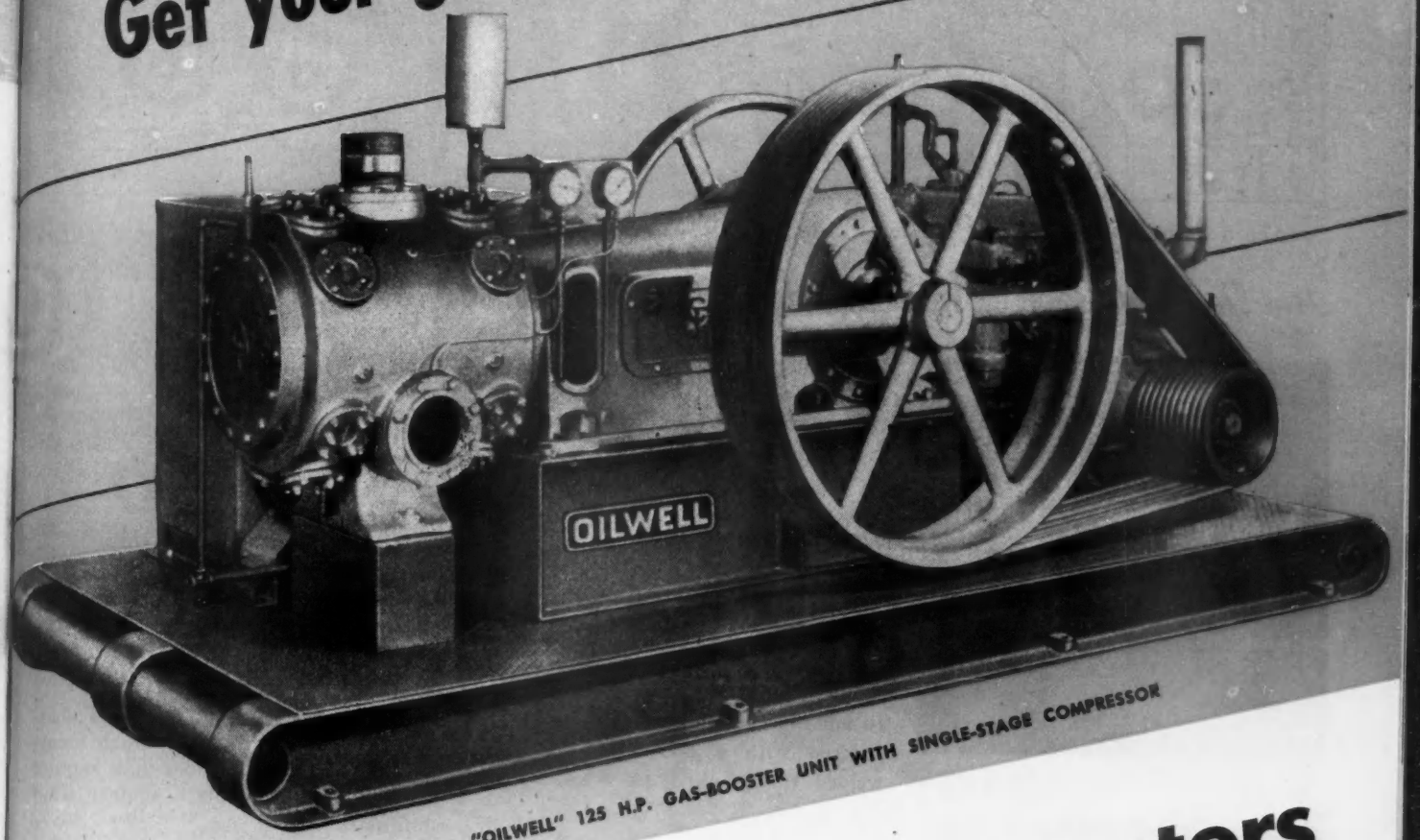

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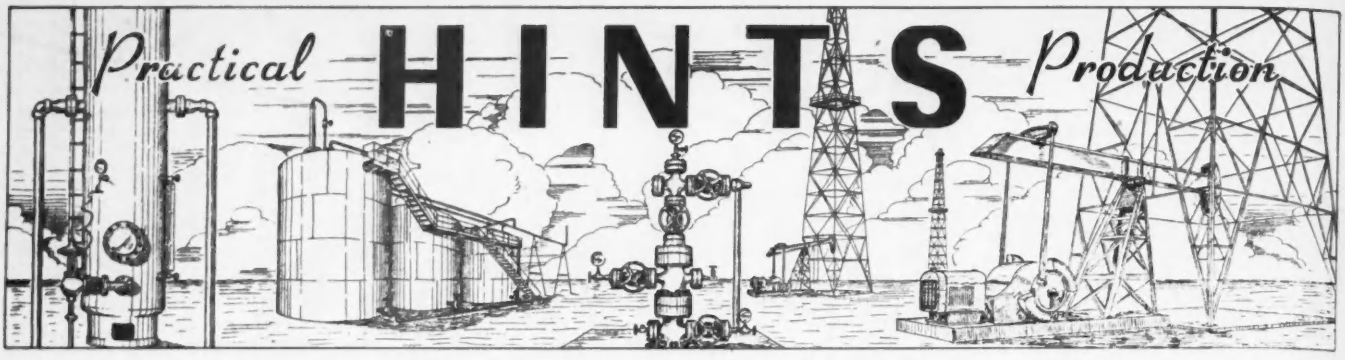
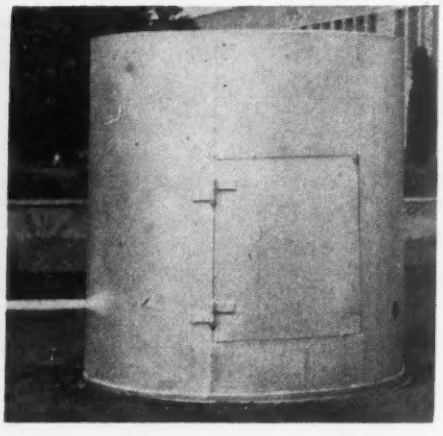


$10.00 is paid for each illustrated acceptable contribution. Mail to The Editor, WORLD OIL, P. O. Box 2608, Houston 1, Texas

How To— Enclose Well Head Equipment on Public Grounds



Leases which include school grounds, church yards or other public areas are especially hazardous. Not only are wells exposed to mishandling or damage through malicious or mischievous manipulation of the flow valves; they also may cause injury to persons or cause serious fires unless especially protected.

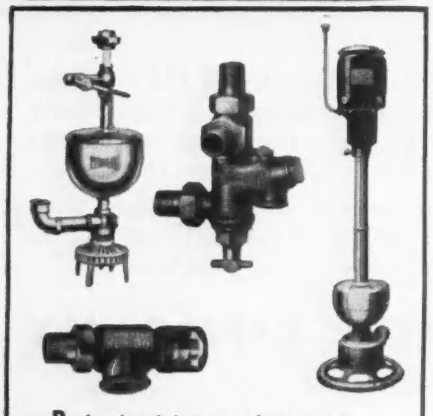
WELL HEAD PROTECTION

A well in a school yard is surrounded by the usual six-foot high wire fence. In addition the entire Christmas tree is covered with a hood. This hood is welded from light tank steel, with a closely fitting door on one side. Two vents, covered with double thicknesses of fine mesh screen, prevent pressure build-up inside the casing. They also act as flame arrestors in case the short grass should be ignited.

When the well must be serviced, the union on the flow line inside the hood is broken, the horizontal flow line unscrewed from the 45-degree ell, and the hood lifted off by screwing eye bolts into the base rim and attaching lines for the winch truck hoist.

The base ring or rim rests in a shallow recess in the concrete which forms the well cellar, but does not require bolts to hold it in place against wind shifting.

PENBERTHY
QUALITY PRODUCTS



Penberthy injectors—ejectors—automatic electric and water (or steam) operated sump pumps are all widely used throughout the oil industry because they have always been dependable under the most severe service conditions.
All are of rugged construction and made by an organization with 59 years experience in the manufacture of highest quality products.

PENBERTHY INJECTOR CO.
DETROIT 2, MICH. Canadian Plant WINDSOR, ONTARIO

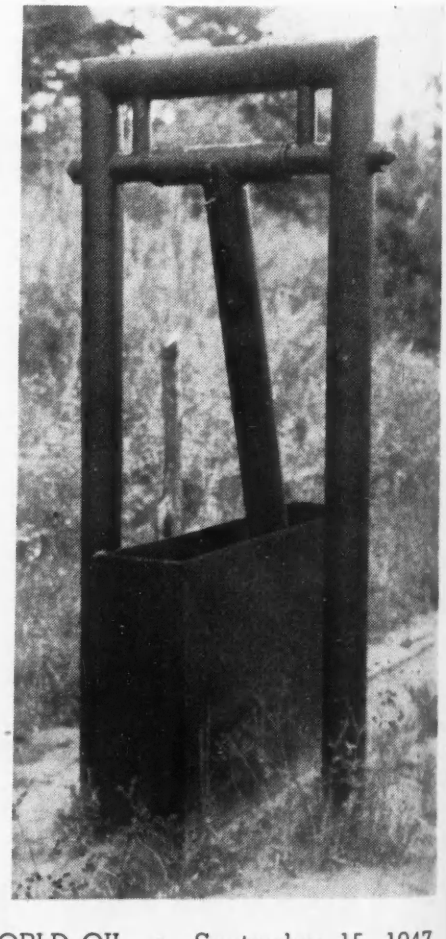
How To— Protect Rod Lines

It was necessary to carry a rod line beneath a roadway at a point where there was heavy runoff after a rain. The line would clog up with trash and dirt, and frequent cleanouts were required.

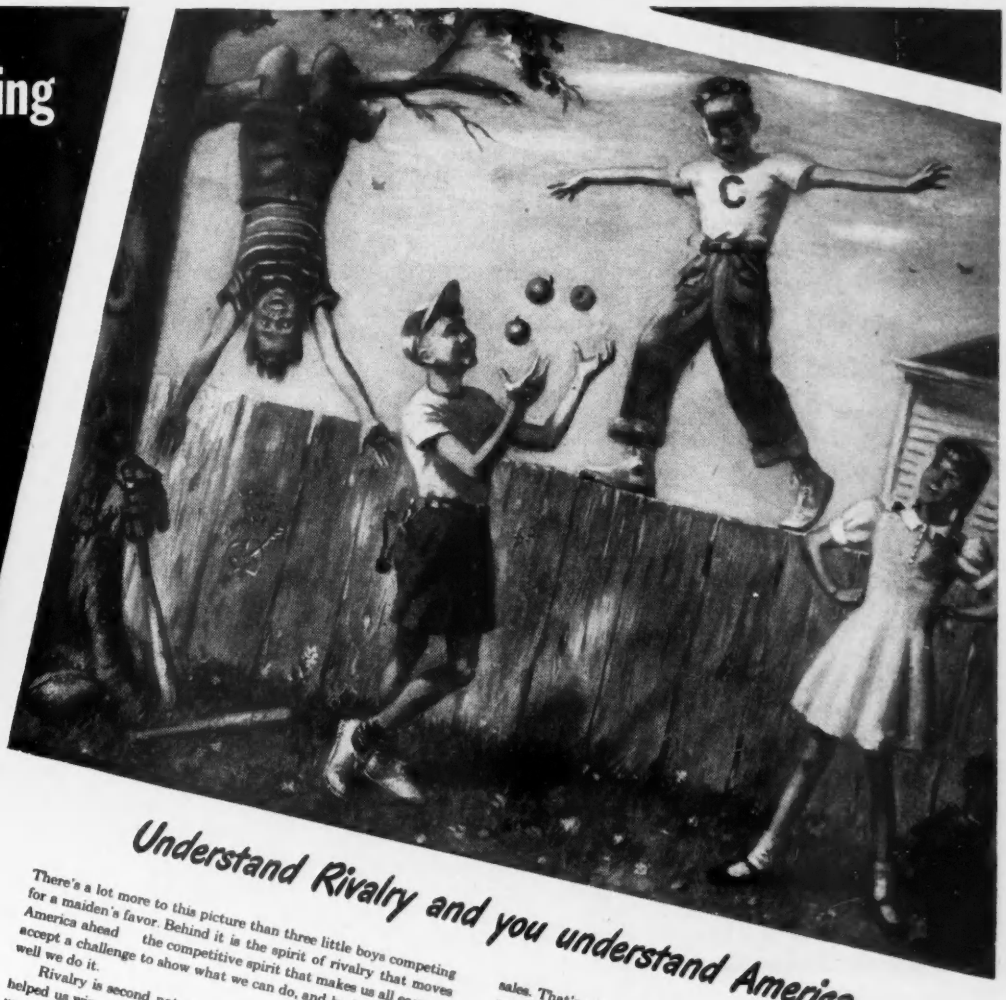
ROD LINE PUMPING

To protect the line, it was strung inside a salvaged string of 8⅝-inch casing, with the open ends carried above the high-water mark. The two hold-downs, one on either side of the road, required openings in the pipe for the swinging arms. These were protected by welding rectangular boxes to the pipe, large enough to take the full swing of the arms. The roller bearings or rod supports inside the pipe were made accessible by welding pipe collars of the same size at each roller and capping them with plugs which could be unscrewed with a bar.

After equipping the rod line with the casing and boxes, no further trouble was met from floods and trash interfering with the motion of the line or the action of the hold-downs.



Are you making Petroleum's New National Campaign work for YOU?



#2 Ad in the series

Understand Rivalry and you understand America

There's a lot more to this picture than three little boys competing for a maiden's favor. Behind it is the spirit of rivalry that moves America ahead — the competitive spirit that makes us all eager to accept a challenge to show what we can do, and be judged by how well we do it.

Rivalry is second nature to Americans. We're raised on it. It helped us win a leadership the whole world envies. Competition is in our blood. We like it. We put it to good use.

Take the Petroleum Industry, with more than 34,000 individual firms of all sizes. In every phase of this business employing 1,250,000 people, companies work to outdo rivals; compete in oil production, compete in refining, compete in research for new uses, compete in sales. That's why Americans get petroleum products at the lowest prices in the world. Taxes and prices vary of course, but gasoline in the U. S. is always the world's best bargain.

Nor does the race to make new products, better products, the race to produce more and more oil to meet record-breaking demand stop with gasoline and lubricants. In a hundred different fields, petroleum and its countless by-products continue the competition.

The result — better health, a chance to go more places more easily, more comfort more constantly more, for you.

THERE'S A PLUS FOR YOU IN PETROLEUM'S PROGRESS

The deepest producing well — 13,888 feet — exemplifies the competitive spirit with which 13,475 production companies seek to help maintain your all-important oil reserves

Special fuel barges — moved over river routes by towboats of enormous power — now deliver as much as 3,280,000 gallons in one tow. 650 companies engage in oil transportation by barge, rail, pipeline or tanker

Today, the modern car gives you far more power, better performance, greater comfort because competition among some 400 refineries resulted in the finer fuels which make possible the high compression engine

Oil from the ground to produce food from the ground. Over 20,000 petroleum distributors and jobbers help fuel the farm machinery used to grow food to feed you.

Service stations everywhere, over 225,000 of them — employing over half a million people at a billion dollar annual payroll — compete with rivals in service to you.

Prepared for the oil industry by the American Petroleum Institute—Copyright, 1947

How to take full advantage of ads like this:

You've seen the start of the new national magazine campaign of the petroleum industry appearing regularly in LIFE, SATURDAY EVENING POST, COLLIER'S and LOOK — some of the page ads in full color and black and white which explain to the public "the plus for you in petroleum's progress." They will reach an estimated audience of more than 58,000,000 people.

• *It Can Do A Real Job*

Now put this campaign directly to work for *you* and *your* firm . . . personalize the theme over your own firm's signature. How? Just mail this coupon and receive FREE the detailed Plan Book just prepared.

Seven Complete Campaigns

The new Plan Book shows you how to make a natural tie-in with the national campaign — offers FREE mats of seven different newspaper campaigns, display material, radio scripts, envelope enclosures — all effective aids to your business.

DON'T DELAY — ACT NOW

Send for your free Plan Book at once. Available to managers and officers of all oil companies, oil associations and affiliated organizations.

Mail this coupon today.

Public Relations Operating Committee, Dept. 20B
AMERICAN PETROLEUM INSTITUTE
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Please forward at once FREE copy of Plan Book.

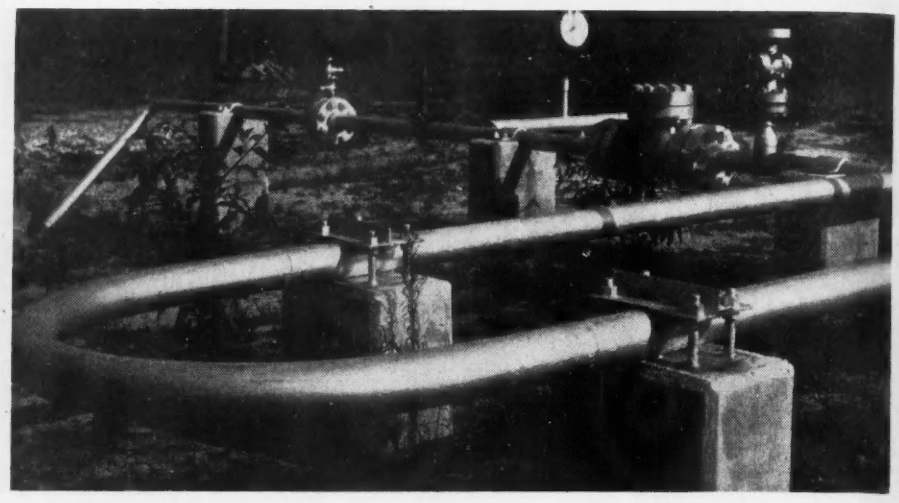
Name .....
Title .....
Company .....
Address .....
City ..... *State* .....

INCREASE PRODUCTION
Clean Out With
MILLER
SAND PUMPS
O.D. SIZES
2½"
3 "
3½"
4¼"
5 "
5½"
7 "
LENGTHS
20'
25'
30'
REGULAR BAILERS
Miller Sand Pump Co.
General Office Box 4516
OKLAHOMA CITY 9, OKLA.
EXPORT OFFICE
30 Rockefeller Plaza
NEW YORK CITY 20, N. Y.
See Composite Catalog Page 2426

Increase RESERVES AND PROFITS BY
Secondary Recovery
EXPERIENCED PRACTICAL CONSULTING
REPRESSURING AND WATER FLOODING
PRODUCTION ENGINEERING SERVICE
- Preliminary Surveys
- Gas Measurements
- Bottom Hole Pressure
- Compressor Plants
- Installation
- Water Treating Plants
- Core Analysis
- Estimate of Results
- Valuations
- Supervision

PETROLEUM ENGINEERS
CABLE & STINE
WICHITA FALLS, TEXAS

How To— Anchor Flow Lines on Gas Condensate Wells

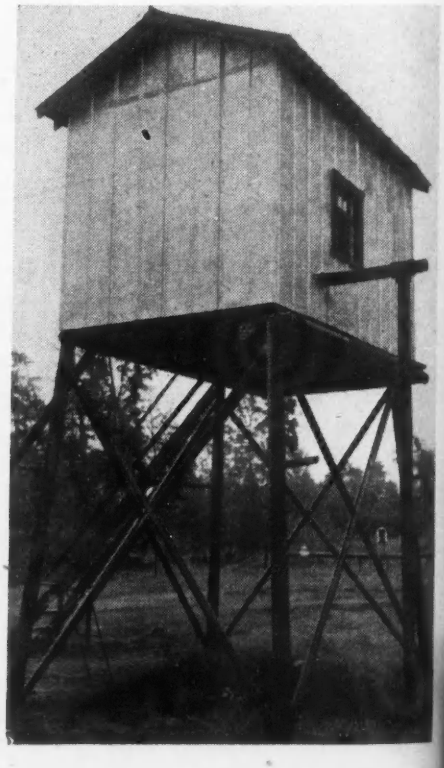


FLOW LINE PROTECTION

The expansion loop at the well head of a condensate well must be braced against vibration or it will break connections. To use the loop to take up expansion, the pipe must be free to open the bend or push out the curved end. One Carthage field well has the bend on plates set at the top of concrete posts, with a plate held across the pipe at this point by a plate secured with four bolts, one at each corner.

The plate is made thin enough to avoid the danger of putting too much pressure on the pipe. The thin plate is reinforced by a length of 2x2-inch angle iron, tack-welded to the plate so as to lie at right angles to the pipe. The four corner bolts are fitted with adjustable nuts below the plate. These are set to permit the desired pressure by individual adjustment. The nut above the plate is then pulled down tight to lock the support and guide in place. A coat of aluminum paint prevents rusting of the plate and bolts.

How To— Support Scaffolding



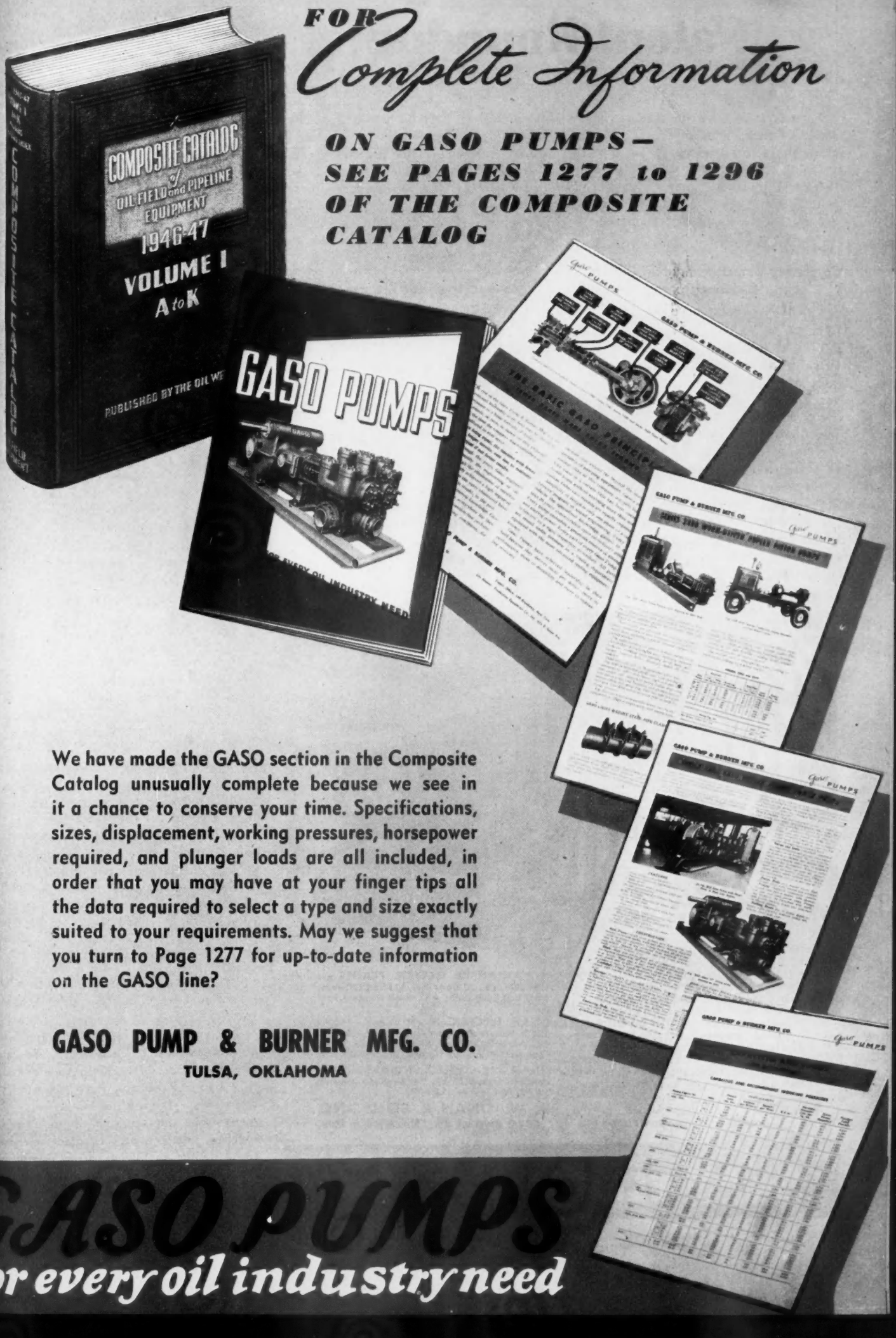
PUMP FOUNDATIONS

In the Sabine River bottoms frequent floods make it necessary to place field pumping units above the high-water mark. This is especially necessary when electric motor drive is employed to power the pumps. One such pump house is carried on a heavy pipe frame, bolted to buried concrete footings. The pump house is of aluminum sheeting, which is kept painted to maintain appearance and secure maximum heat radiation.

To speed up the painting job, to each of the corner posts was welded a spur or arm of 2-inch pipe about 2 feet below the floor level, which is an extension of a diagonal line through opposite posts. The support will thus take planking across a side or end, forming a stage or scaffold at the proper height for quick, and safe, painting of the walls.

FOR *Complete Information*

ON GASO PUMPS—
SEE PAGES 1277 to 1296
OF THE COMPOSITE
CATALOG



We have made the GASO section in the Composite Catalog unusually complete because we see in it a chance to conserve your time. Specifications, sizes, displacement, working pressures, horsepower required, and plunger loads are all included, in order that you may have at your finger tips all the data required to select a type and size exactly suited to your requirements. May we suggest that you turn to Page 1277 for up-to-date information on the GASO line?

GASO PUMP & BURNER MFG. CO.
TULSA, OKLAHOMA

GASO PUMPS
for every oil industry need

Patent Roundup

Patents issued by the United States Patent Office, Washington, D. C., include those listed below.

Printed copies of the patents listed are furnished by the Patent Office for 25 cents per copy and can be had by addressing the Commissioner of Patents, Washington 25, D. C.

Separating Constituents of an Oil-Water System

This patent (No. 2,425,355) was held by Claudius H. M. Roberts, Palos Verdes Estates, Calif., who assigned it to Petrolite Corporation, Ltd.

In a receptacle containing superimposed bodies of liquids comprising respectively, oil and water which has separated from the oil, a device for resolving sludge in a sludge zone maintained in a substantially fixed position just above the separated water consists of the following arrangement: a pair of elongated electrodes extending in the sludge zone and spaced from each other; a means for insulating one of the electrodes from the other and for retaining the electrodes side by side in spaced relation; means for impressing a potential difference between the electrodes, establishing an electrical field between them of such intensity as to resolve the sludge; and a means for moving the electrodes in the sludge zone as a unit to bring different portions of the sludge into the electric field between the electrodes.

Floating Roof for Storage Tanks

John H. Wiggins, Chicago, has patented apparatus No. 2,425,771. It is unassigned.

The floating roof has a stiff outer pontoon, a stiff center pontoon having a peripheral rim to the inner edge of which a flexible deck portion is attached near the bottom of the pontoon. This deck is also attached to the outer edge of the outer pontoon. There is a means for causing part of the weight of the outer pontoon to exert a downward force or load on the rim of the center pontoon, such means consisting of vertically-disposed posts on the center pontoon located near its rim and radially-disposed tension members co-acting with the posts and attached at their outer ends to the outer pontoon.

Logging Drill Holes

Lyle Dillon, Los Angeles, has assigned patent No. 2,425,868 to Union Oil Company of California.

The method consists of varying the characteristics of an electric current in accordance with a function of the physical characteristics of the well and converting the current into mechanical vibrations of a character corresponding to the character of the current, which vibations are detected and received at the surface of the well.

Inserting Orifices in Pipe

Patent No. 2,426,106 is owned by Myron M. Kinley, Houston, and is unassigned.

The device for shooting orifice bushings into well pipe comprises a housing and a means to anchor it in the pipe, a wedge member which is slidable in the housing. An explosive means drives the member. In addition there is a carrier disposed against the wedge face on the wedge member which moves laterally in the housing when the wedge member is moved by the explosive means, and an orifice bushing mounted on the carrier but releasable, which may be forced into the pipe by movement of the carrier.

Pipe Handling Apparatus

A device for handling pipe (No. 2,425,292) has been patented by Carl J. McCoy, Orcutt, Calif., and is unassigned.

The apparatus is a grip consisting of a carriage having a jaw-mounting shaft with guide arms upon the opposite ends in angularly spaced relation; a yoke mounted on the shaft for sliding and pivotal movement; a pair of jaw members pivoted on the shaft between the yoke arms and slidably movable along the shaft with the yoke; a means carried by the jaws for engaging the guide arms to cause pivotal movement of the jaws; a sheaved pulley for mounting the carriage on a trolley line.

Pipe Line Fittings

This fitting (No. 2,425,934) has been patented by Leland S. Hamer, Long Beach, Calif.

Two body sections, which are shiftable in relation to each other, are operated by a method including a block carried by each section that has a means releasably retaining the block in engagement with the sections. A tie member extends between and connects the sections, being anchored to one block and engaged with the other to shift it relative to the first block when the member is rotated.

New HEAVY-DUTY ELECTRIC PLANT

5000 WATTS

Only 272 lbs!

5CK-115M
$545.00
FOB MINNEAPOLIS

• Large capacity, compact design, and lightweight aluminum construction are combined in this new, rugged, portable electric plant. Easily carried by two men. Powered by Onan 10 HP horizontally-opposed, two-cylinder, 4-cycle, air-cooled engine. Unusual operating economy. Shipped complete, equipped with four-receptacle outlet box and mounted in tubular-steel guard frame.

NEW ONAN CK ELECTRIC PLANTS are available in 5,000 Watts D.C., 115 and 230 volts; 2000 and 3000 Watts A.C. in all standard voltages.

ONAN ELECTRIC PLANTS—A.C.: 350 to 35,000 Watts in all standard voltages and frequencies. D.C.: 600 to 15,000 Watts, 115 and 230 Volts. Battery Chargers: 500 to 6,000 Watts, 6, 12, 32 and 115 Volts.

ONAN AIR-COOLED ENGINES—CK: 2-cylinder opposed, 10 HP. BH: 2-cylinder opposed, 5.5 HP. IB: 1-cylinder, 3.25 HP.

Onan PRODUCTS

Write for Catalog

D. W. ONAN & SONS INC.
4749 Royalston Ave., Minneapolis 5, Minn.

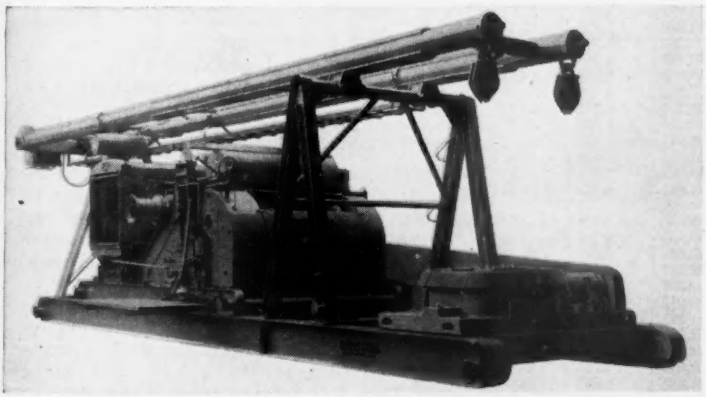
ONAN ELECTRIC PLANTS

PAY FOR YOUR . . . .

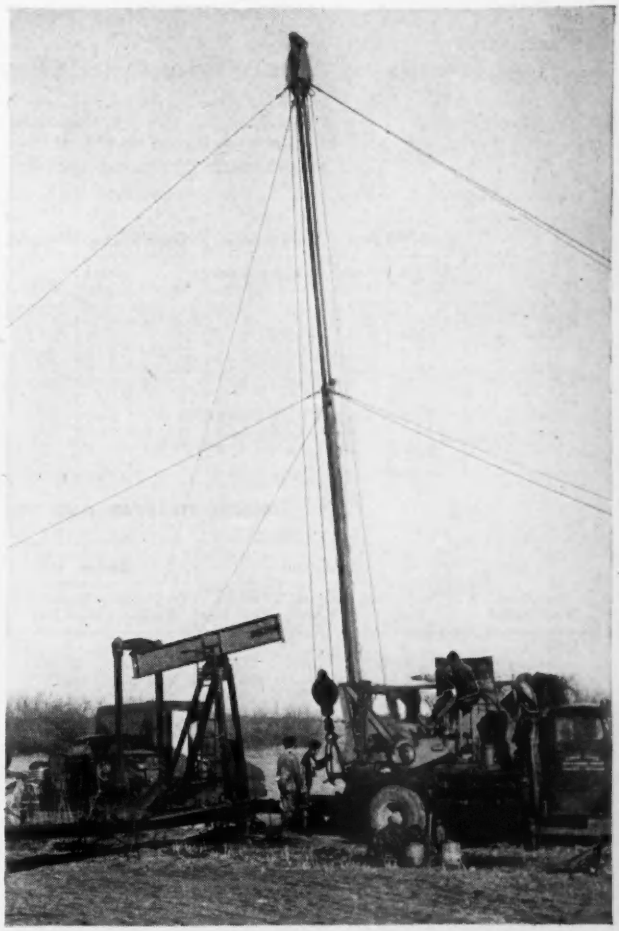
"Cardwell" Portable Mast

Moving costs and rigging-up time are minimized because these masts are transported on the rig. The rig can be moved in and the mast raised and telescoped in record time. This means more and faster jobs, busier crews and greater profits.

All "Cardwell" rigs with masts can be hauled in one piece.



Model S hoist with 65-foot double leg mast, subframe and rotary table. Rig is capable of handling rotary workover jobs to 6,000 feet.



Model H single drum servicing hoist with 48-foot telescoping mast. Cross sheave crown permits block to travel three feet higher than when sheaves are mounted in line. 48- or 55-foot masts are available with cross sheave crown or with three sheaves mounted in line. Mast can be easily removed for derrick operations. Hoist is shown pulling rods and tubing from 3,910-foot well.

CARDWELL MFG. CO. INC.

P. O. Drawer 2001 . . . Long Distance Telephones 128 – 129 – 130
Cable Address: "ALL STEEL," Wichita — "CARDSTEEL," New York
Wichita, Kansas, U. S. A.

IMMEDIATE DELIVERY

ON MANY "CARDWELL" RIGS WRITE OR PHONE FOR INFORMATION

Crude Production Soars to New High; Runs to Stills At Near-Record Level

Crude production was raised to a new all-time record in the week ended September 6, latest report of the API showed. Near-record runs to refinery stills kept output of principal products high and fairly well in line with heavy requirements. Gasoline stocks continued their seasonal decline, while fuel oils' were substantially increased.

U. S. Crude production averaged 5,173,000 barrels daily in the week of September 6, an increase of 16,000 barrels per day over the previous week's rate, and 373,000 barrels daily or 7.8 percent over last year's like period. This was a new production record and exceeded the old high of three weeks ago by 14,000 barrels a day.

Daily crude runs to stills amounted to 5,246,000 barrels during the week, increasing 37,000 barrels a day over the preceding week's runs, and 370,000 barrels daily or 7.6 percent over those in the comparable week a year ago. The highest daily runs were in the week of August 2, this year, when they amounted to 5,271,000 barrels.

Stocks of refinable crude totaled 228,281,000 barrels on August 30, the Bureau of Mines reported. That amount was 639,000 barrels more than was reported a week earlier and 1,149,000 barrels more than was on hand a year before.

Production of gasoline, which included natural blended at refineries, totaled 16,205,000 barrels, a cutback of 548,000 barrels from the previous week's output, but 799,000 barrels or 5.2 percent more than was produced a year ago. Stocks of finished and unfinished gasoline continued their seasonal declines by dropping 769,000 barrels during the week and ending at 83,336,000 barrels. That amount was 3,573,000 barrels or 4.1 percent less than was in storage a year ago.

The week's output of distillate fuel oils amounted to 6,337,000 barrels, an increase of 418,000 barrels over the previous period, and 828,000 barrels or 15 percent over a year before. Stocks of these oils climbed 1,955,000 barrels and ended the week at 56,763,000 barrels.

Trends of Operations and Changes in Stocks

Figures on crude stocks are from Bureau of Mines weekly reports; all others from American Petroleum Institute weekly reports, which are estimates on Bureau of Mines basis.

(All figures in thousands of barrels—add 000)

HIGHS AND LOWS OF RECENT YEARS

ITEM	Crude Oil Prod.		Runs to Stills		Crude Stocks		Gasoline Stocks		Gasoil and Distillate Stocks		Residual Fuel Oil Stocks	
	Barrels Daily	Week Ended	Barrels Daily	Week Ended	Barrels	Week Ended	Barrels	Week Ended	Barrels	Week Ended	Barrels	Week Ended
High:												
1942	4,337	2- 7	3,961	1- 3	263,208	3-28	[1]109,281	3-14	47,861	11-14	95,857	1- 8
1945	4,944	7-21	5,140	8-18	227,554	10-13	99,102	3-24	45,341	11-17	56,074	1- 6
1946	4,961	6-15	4,968	12-28	229,430	3- 2	105,223	2-16	[1]67,286	11- 9	61,036	11- 2
1947	[1]5,173	9- 6	[1]5,271	8- 2	239,370	5-31	107,576	3-29	58,034	1- 4	56,168	9- 6
Lows:												
1945	3,621	10- 6	3,409	10- 6	[2]211,813	8-35	70,791	10-13	26,483	3-17	38,548	5-26
1946	4,403	3- 9	4,498	1-12	218,193	1- 5	85,324	9-28	25,131	3- 9	37,289	4- 6
1947	4,531	4-11	4,667	4-12	220,313	2- 8	83,336	9- 6	31,470	4-19	42,668	4-26

TRENDS OF 1946 AND 1947

Trends in Week Ended	Crude Oil			Gasoline		Gasoil and Distillate		Residual Fuel	
	Production Daily	Runs to Stills Daily	Stocks Week End	Production Weekly	Stocks Week End	Production Weekly	Stocks Week End	Production Weekly	Stocks Week End
1946:									
January 5	4,548	4,651	218,193	14,488	98,494	5,923	35,199	8,867	42,371
January 26	4,626	4,553	220,544	13,622	101,737	5,720	29,498	8,411	39,722
February 23	4,714	4,595	226,699	13,175	104,709	5,728	25,398	7,913	39,290
March 30	4,425	4,684	224,994	13,896	104,715	5,337	28,240	8,738	37,746
April 27	4,672	4,685	224,443	14,228	99,531	5,568	30,466	9,204	39,404
May 25	4,759	4 857	222,214	14,312	95,769	5,463	32,973	8,908	48,368
June 29	4,957	4,854	223,883	14,500	92,333	5,325	37,762	8,828	46,477
July 27	4,926	4,896	223,756	14,535	88,626	5,817	44,316	8,217	49,517
August 31	4,833	4,911	227,132	15,014	87,217	5,630	53,134	8,539	53,173
September 28	4,778	4,829	223,043	14,675	85,324	5,632	59,827	8,172	57,657
October 26	4,730	4,758	221,184	14,863	86,423	5,710	65,499	7,728	60,872
November 30	4,795	4,707	227,693	15,145	88,371	5,258	66,062	7,672	58,647
December 28	4,713	4,968	225,995	15,604	93,126	5,931	58,941	8,181	53,427
1947:									
January 4	4,469	4,917	223,291	15,281	94,882	5,957	58,034	8,375	53,285
January 25	4,672	4,820	221,665	14,624	99,801	5,630	50,357	8,224	48,558
February 22	4,786	4,860	224,580	14,668	103,904	5,929	40,739	8,542	44,919
March 29	4,865	4,843	227,529	14,396	107,576	5,969	32,737	8,688	43,364
April 26	4,930	4,725	235,383	14,213	103,860	5,435	32,286	8,186	42,668
May 31	5,024	5,000	239,370	14,709	95,876	5,732	36,032	8,910	45,224
June 28	5,109	5,093	236,221	16,070	91,806	5,006	41,721	8,298	48,490
July 26	5,084	5,162	231,357	16,142	85,812	5,708	47,097	8,738	52,497
August 2	5,098	[1]5,271	231,469	16,517	85,645	6,004	48,574	8,582	53,107
August 9	5,105	5,184	227,779	16,163	84,898	5,932	49,545	8,757	53,531
August 16	5,159	5,202	226,076	16,056	84,983	6,061	51,685	8,831	54,000
August 23	5,153	5,217	227,642	16,539	83,915	5,892	53,018	8,674	54,688
August 30	5,157	5,209	228,281	16,753	84,105	5,919	54,808	8,962	55,242
Sept. 6, 1947	[1]5,173	5,246	.....	16,205	83,336	6,337	56,763	8,708	56,168
Sept. 7, 1946	4,800	4,876	[3]227,132	15,406	86,909	5,509	55,626	8,102	54,936
Change:									
In Week	+16	+37	+639	−548	−769	+418	+1,955	−254	+926
In Year	+373	+370	+1,149	+799	−3,573	+828	+1,137	+606	+1,232
In Year	+7.8%	+7.6%	+0.5%	+5.2%	−4.1%	+15.0%	+2.0%	+7.5%	+2.2%

[1] All time peak. [2] Lowest since December, 1921. [3] Stocks, August 31, 1946.

Santa Fe Springs, California, Crude Brings More Than $2

Crude from California's Santa Fe Springs field was given a price increase by Union Oil Company September 1 to bring it above $2 per barrel for the first time. Prices for refined products showed little change last week, as demand for the lighter products remained heavy with supplies tight in most areas. However, several areas experienced some letup in the heavy fuels.

Union advanced the prices of Santa Fe Springs crude 7 to 11 cents a barrel, effective September 1. Union's prices now range from $2.03 a barrel for 27-gravity to $2.27 for 34-gravity. This increase marks the first time that this crude has sold for over $2 a barrel. Standard Oil Company of California's prices for the same grades are $1.89 to $2.15 per barrel.

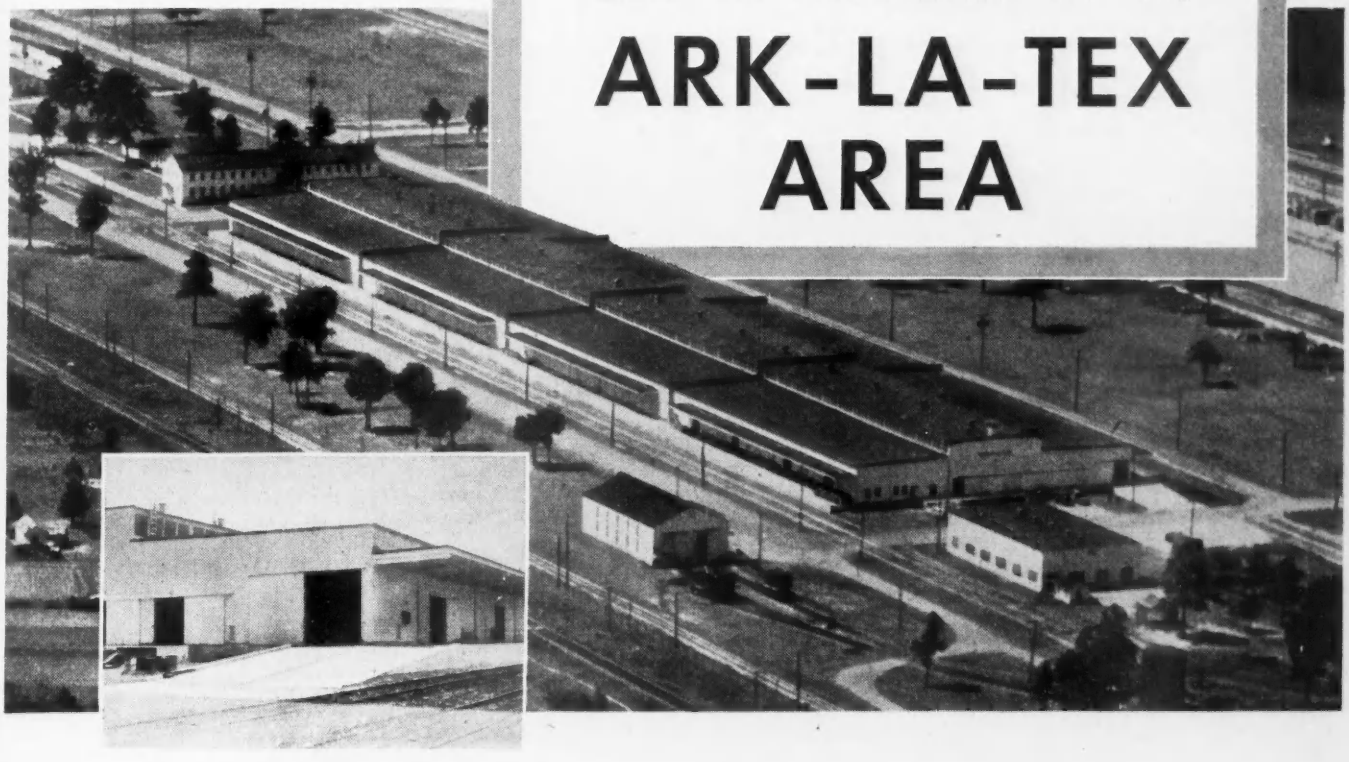
Easing of heavy fuel oil demand was indicated in reports of refiners and tank car marketers in the Midwest last week, while supplies of all other products continued to be tight. Industrial buyers, with tanks full of heavy oil, were reported showing no interest in taking additional supplies, and refinery inventories were said to be building in the Mid-continent. Industrials were said to have had no trouble in obtaining supplies of gas during the summer and were holding on to residuals for winter use.

Some easing of heavy fuel supply in central Michigan was reported by refiners, reflecting general slackening of industrial demand in the Midwest. Prices were unchanged and firm, however. Slight easing in tight Michigan crude supply was also indicated in refiners' reports.

Inquiry at the Gulf Coast for gasoline and light fuels from Midwest buyers remained active during the week, it was reported, but trade sources said barge and tank car buyers were beginning to resist the payment of premiums that have been asked.

Stocks of heating oils were reported rising on the Atlantic Coast as the result of some buyers holding off in hopes of lower prices, but the majority of suppliers were said to be unwilling to sell spot because of uncertainty over the severity of coming winter and future supplies.

DEEP IN THE HEART OF THE ARK-LA-TEX AREA



Well-built, Adaptable Manufacturing, Processing or Warehousing Space Available Now

Former Shreveport, Louisiana, Quartermaster Depot, for sale or lease in whole or major part

ARK-LA-TEX Serve 36,000 oil and gas wells now operating in the Ark-La-Tex (Arkansas-Louisiana-Texas) Area from its geographical center, Shreveport. Oil and gas field equipment manufacturers and service-repair organizations will find Shreveport an ideal location for efficient, economical operation.

Industrial plant space, 523,452 sq. ft. of it, in three buildings alone, is available now at this former Shreveport Quartermaster Depot. Many types of manufacturing, processing and fabricating can be accommodated here.

THE BUILDINGS. Three buildings are each 181′ x 964′, of frame construction, with built-up roofs. Each building has 174,484 sq. ft. of floor space with concrete floors and loading docks. Two are equipped with ventilating fans. The third is heated by 96 gas-fired space heaters. Clearances from floor to beams are from 13 ft. at sides, to 18 ft. at centers.

Administration Building is 37′ x 157′, two-story, concrete pier foundation, wood floor, wood frame walls, subdivided for office space.

Other buildings, some 42 in number, are also offered.

COMPLETE INFORMATION. Write now for a detailed description of individual buildings. Address all inquiries to the Regional Office address given below.

THE SHREVEPORT LOCATION. This 337-acre property lies about 1½ miles south of Shreveport, adjacent to the industrial Cedar Grove district. Shreveport is 50 miles from the Winnfield, Louisiana, limestone deposit extensively used in Louisiana as calcium supply.

★ ★ ★

The Texas and Pacific Railroad and Kansas City Southern Railroad serve the plant area. Both railroads have track connections with the *18 miles of trackage* located inside the depot property. This trackage is of 85-lb. rail.

★ ★ ★

Utilities are available. A large, concrete water reservoir is used for fire protection. The plant is served by paved roads.

SEALED BIDS. Your sealed proposals, on Standard Bid Forms, must be received by 3:00 P.M., C.S.T., October 17, 1947, at War Assets Administration, Office of Real Property Disposal, 7020 Franklin Avenue, Station D, New Orleans 17, Louisiana. Qualifying small business may purchase through RFC's priority.

Address all requests for bid forms and property descriptions to:

WAR ASSETS ADMINISTRATION
OFFICE OF REAL PROPERTY DISPOSAL

7020 FRANKLIN AVENUE, STATION D, NEW ORLEANS 17, LOUISIANA

1328-T

• Oklahoma

Link Field Extended East; West Morse Moves West

Link oil field extended east; Okfuskee well extends West Morse pool ½ mile west; wild well brought under control; Sinclair well in East Lindsay pool flows 2100 barrels daily; Fourdee pool extended northwest.

Muskogee County: The old Link pool, northwestern part of the county, has been extended ½ mile east by Link Oil Company's Pickard 2, NW NW SW 29-15n-15e. The Dutcher sand, pay zone of the pool, was picked up at 1620 feet, and the hole filled with oil to top immediately. It flowed at the rate of 100-150 barrels per day. Mid-Continent Pipe Line Corporation is installing a connection to the well. Link Oil Company, at the close of 1946, revived the pool by bringing in a 100-barrel producer in the Dutcher sand, in the northeast quarter of 30-15n-15e. Two additional wells in that sector were compelted early this year.

Okfuskee County: Successful completion of George T. Davis et al's Callahan 1, NE NE NW 24-12n-9e, has resulted in ½-mile west extension of the West Morse pool. On a drill-stem test of the Gilcrease sand at 3132-44 feet, the well showed gas in 14 minutes and recovered 1000 feet of oil and 30 feet of mud.

Crews have brought under control W. A. Fleming et al's Harjo 3-A, wild oil well in NW SE NW 16-10n-11e, Weleetka area. The well blew out from the Salt sand at 1636-45 feet, total depth, while crews were drilling with cable tools. There was only 400 feet of pipe in the hole at the time of the blowout, and flow was estimated from 35 to 50 barrels of oil per hour. Mid-Continent Pipe Line crews recovered 770 barrels of oil in 24 hours from pits and trucked it to a pipe line. Tanks were being erected.

McClain County: Sinclair Prairie Oil Company has completed 1 of the best producers to date in the East Lindsay pool at Harris 1, CSE SE 36-5n-4w. The well flowed an average of 90 barrels of oil per hour, and was finaled for a flow of 2125 barrels in 24 hours through ¾-inch choke.

Noble County: Anderson - Prichard Oil Corporation has extended the new Fourdee pool ½ mile west with Bocox 1, SE SE SW 19-22n-1w, northwest of Perry townsite. Mississippi lime was found at 4750 feet, and the well flowed 97 barrels of oil and 19 barrels of water in 4 hours from 4756-92 feet. By swabbing and flowing the well made 122 barrels of oil and 25 barrels of water in 11 hours. Testing continued.

Wells Completed in United States in Week Ended September 6, 1947

Data preliminary and subject to revision. Revised and more complete data on all completions and exploration shown in monthly summaries published in last issue of each month.

State or District	FIELD COMPLETIONS: New Wells: Oil	Dist.	Gas	*Input	Dry	Total	Old Wells Deepened	EXPLORATORY COMPLETIONS: Oil	Dist.	Gas	Dry	Total	ALL COMPLETIONS: This Week	Last Week	This Week 1946
Alabama															1
Arkansas	3				4	7					4	4	11	9	3
California	26		1		2	29					6	6	35	37	28
Colorado	1					1					1	1	2	5	4
Florida											2	2	2		
Illinois	17				13	30	2	2			8	10	42	40	48
Indiana	5		1		6	12					2	2	14	14	13
Kansas	26		6		6	38	3	2			10	12	53	47	39
Kentucky	5				3	8		1			1	2	10	10	13
Louisiana	31		1		8	40		1	1		8	10	50	32	31
N. Louisiana	21		1		4	26					6	6	32	17	17
S. Louisiana	10				4	14		1	1		2	4	18	15	14
Michigan	15		1		2	18					7	7	25	16	21
Mississippi	4				3	7					3	3	10	12	6
Montana	2		1		2	5		1				1	6	4	5
Nebraska											1	1	1		
New Mexico	7		1		1	9					3	3	12	13	4
New York	12			14	1	27							27	27	26
Ohio	7		10		5	22							22	28	21
Oklahoma	35		1		16	52	3	2	1		12	15	70	92	59
Pennsylvania	19		13	21	4	57							57	57	52
Texas	104		5		47	156	3	4	1		38	43	202	180	135
DISTRICTS:															
1—S. Central					1	1					5	5	6	12	5
2—Middle Gulf	5				2	7					2	2	9	11	[1]
3—Upper Gulf	10				5	15	1				8	8	24	12	20
4—L. Gulf-S.W.	4		1		3	8		2	1		7	10	18	23	22
5—E. Central	1					1							1	3	[2]
6—Northeast	4		3		1	8					2	2	10	7	2
7-B—N. Central	16		1		9	26		1			6	7	33	8	[3]
7-C—W. Central	4				1	5							5	5	[4]
8—West	30				2	32		1			1	2	34	37	42
9—North	25				16	41	2				7	7	50	49	40
10—Panhandle	5				7	12							12	13	4
West Virginia														12	20
Wyoming	4					4		1				1	5	4	1
Total U.S.	323		41	35	123	522	11	14	3		106	123	656	639	530

* Includes salt water disposal wells. [1] Middle Gulf included with Lower Gulf-S.W. [2] East Central included with Northeast. [3] North Central included with North. [4] West Central included with West.

• Kansas

Comanche County May Get Gas Pool in Turkey Creek Area

Comanche County has possible pool opener; Harvey County wildcat logs shows in Mississippian; Marion County test may open Viola lime pool; oil shows logged in McPherson County wildcat.

Comanche County: Possibility that a gas pool may be opened 8 miles southwest of the Turkey Creek pool of Barber County was looming as gas shows were encountered in the Mississippi lime. The test is Stanolind Oil & Gas Company's Winkler 1, NE NE NW 6-31s-19w. A series of drill-stem tests in the Mississippi, topped at 5018 feet, showed considerable gas. Crew will drill ahead before testing further.

Harvey County: Alpine Oil & Royalty Company's Eshom 1, SE SW SW 35-22s-3w, east of the Stucky pool, is showing for both oil and gas production from the Mississipi lime at 3183-3267 feet, total depth. Following acid treatment at 3219-40 feet, 1800 feet of oil rose in the hole, and at that depth the well flowed 20 barrels of oil per day. From 3190-96 feet, the well flowed 1½ million cubic feet of gas.

Marion County: Testing was under way at the Veeder Supply Company et al's Suderman 1, SE NE 28-20s-2e, south of Hillsboro. A good show of oil was logged in the Viola lime, topped at 2943 feet. Simpson sand was found at 3005 feet, with total depth 3028 feet.

McPherson County: Mallard and associates have cemented 5-inch pipe at 2690 feet at Hart 1, wildcat in SE SW 33-17s-1w, 2 miles south of Roxbury. A show of oil was found in the chat at 2689-98 feet, and testing of the zone will begin shortly.

Unit Operation Order Issued For West Cement Field Zone

In the second unit operation order issued by the Oklahoma Corporation Commission under the 1945 unit operation law, the commission authorized unitization of the Medrano sand zone of the West Cement field in Caddo County.

Operators in the sand zone of the field will meet soon to set up management for unit operation of the 37,000-acre field.

(The first unit operation approved by the Commission was the big four-county West Edmond field, which will start October 1 under management of Sohio Petroleum Company.)

Phillips Petroleum Company was designated unit manager of the Cement-Medrano unit. Operators controlling in excess of 94 percent of the field joined with Phillips in the original application, first filed under the 1945 law.

The order covers 37 oil wells and 19 gas wells on the structure, and evidence was that seven or eight additional wells would be drilled on the south flank of the zone in order to facilitate production and recovery of the oil.

Engineers' estimates give total oil in place in the zone at 97 million barrels, with 110 billion cubic feet of gas.

Jeffrey

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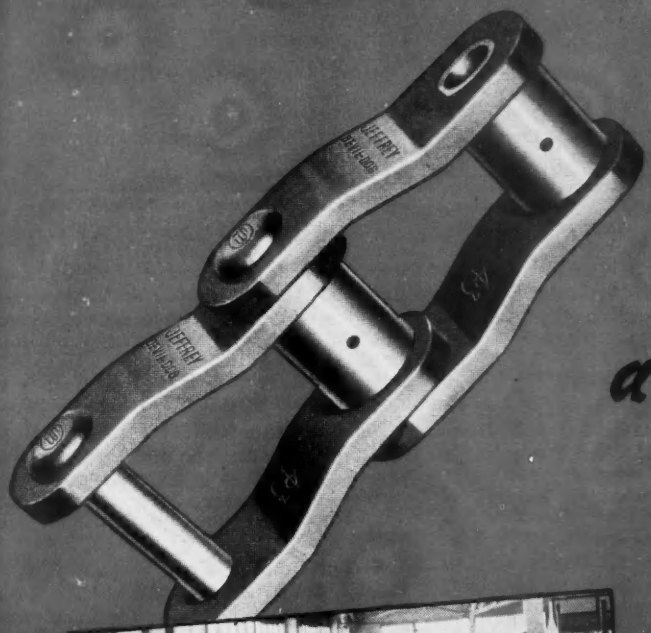
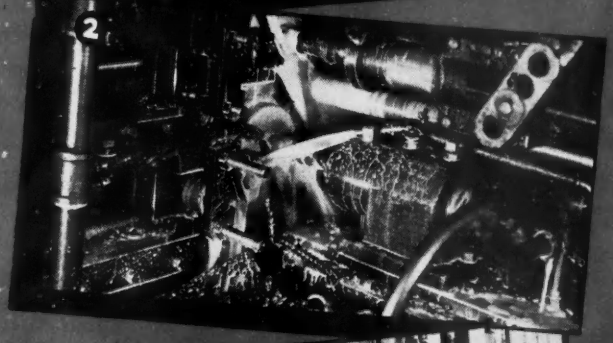


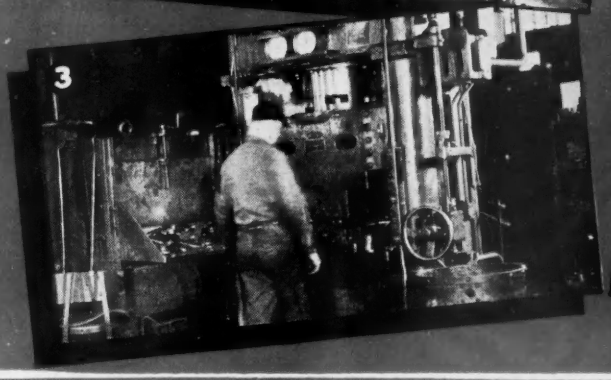
Here are glimpses of a number of the exacting steps Jeffrey takes to obtain the accuracy of fit, smoothness and long life for which Jeffrey Oil Well Chains are known.

1. All chain steel is subjected to a rigid chemical, physical and micrographic analysis in this metallurgical laboratory.



2. Rollers and thimbles are turned from solid bars. Parts are exact duplicates, insuring perfect fit. Thimbles are internally and externally ground.

3. Side bars are offset by powerful hydraulic presses to eliminate deformations and obtain absolute uniformity.



4. Only a modern heat-treating department like this can condition the newer alloy steels that make Jeffrey Oil Well Chains better.

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• New Mexico

Vacuum Area Wildcat Swabs Oil After Being Treated

Vacuum area wildcat swabs oil, will re-treat; Lea County outpost testing.

Lea County: Cole-Darden Oil Company's Phillips-State 1, wildcat in 30-17s-34e, Vacuum area, swabbed 10 barrels of oil per hour after treating open hole. Operators were preparing to re-treat with 5000 gallons of acid. Test is being made in the San Andres at 4609-760 feet. Total depth is 4760 feet. Earlier a drill-stem test of the interval recovered gas-cut mud and heavily oil-cut mud, but the hole was in bad condition due to cavings.

Stanolind Oil & Gas Company's outpost, Southland Royalty Company 1, 8-21s-37e, between the Skaggs-Cass and Drinkard fields, was still testing, with bottom of hole at 6684 feet in the Clear Fork. The well had good recovery of oil from 6530-662 feet in the Yeso zone.

Continental Oil Company's Skaggs 6-B-23, 23-20s-37e, took a drill-stem test of the Devonian from 8155-8354 feet, recovering sulfur water but no shows. The well will be plugged back to test shows in the upper Strawn and Drinkard zones.

Chaves County: Continental Oil Company's Royce Lankford 1, wildcat in 2-14s-26e, reportedly had gas recovery on a drill-stem test at 6750-70 feet in the lower Pennsylvanian. Drilling continued below 6790 feet.

• West Texas

Ector Strike Being Finaled; Ellenburger Discovery Tested

Ector County discovery being completed; operators test pay thickness of new Ellenburger pool; Dollar Hide extension runs 3 drill-stem tests, 2 with good showings; Sterling and Gaines counties wildcats have nominal showings.

Ector County: Humble Oil & Refining Company was completing its discovery, Yarbrough & Allen et al 1, Sect. 18, Block B-14, Public School Land Survey, which began to make 41-gravity oil at the rate of 34.33 barrels per hour. Gas-oil ratio was 791/1. The well previously was shut in and swabbed 8 times. It probably will be completed in open hole, with total depth 10,620 feet, and 5½-inch casing cemented at 10,596 feet.

Humble's Earl Best 1, 5 miles northwest, in Sect. 17, Block B-8, PSL Survey, recovered heavily gas-cut mud with a slight show of oil on drill-stem test at 9173-9256 feet. Drilling continues below 9280 feet.

Phillips Petroleum Company and The Texas Company's Cowden-McEntire 1, Sect. 18, Block 44, T-1-N, T&P Survey, Ellenburger discovery, ran a drill-stem test at 8230-80 feet, which in the last hour of the 77-minute test flowed 119 barrels of 44.5-gravity oil. Another test from 8330-80 feet flowed to tanks for 1 hour making 105 barrels of 44-gravity oil, with a gas-oil ratio of 318/1. Operators will drill ahead, testing the pay section, which is at least 350 feet thick.

Andrews County: Lion Oil Company's Tennie-Cowden B-1, Sect. 6, Block A-55, PSL Survey, ½ mile west extension to the Dollar Hide field, continued drilling below 8430 feet, after completing 3 drill-stem tests. First test at 8306-31 feet recovered gas, muddy oil and free oil; second test at 8309-71 feet recovered gas, mud, and then flowed to tanks, making 16 barrels the first hour and 13 barrels the second hour, without formation water. Packer failed on the third test. Lion has staked 2 more tests just east of the discovery, to drill to 8500 feet.

The Pure Oil Company and Humble Oil & Refining Company have staked a northwest offset, E. P. Cowden 2-E-A, to their Ellenburger discovery, 1 mile north of the Dollar Hide pool, which is still testing. The venture will go to 10,000 feet.

Sterling County: Plymouth Oil Company's wildcat, Georgia Frost 1, Sect. 39, Block 2, H&TC Survey, after 24-hour swabbing, recovered 248.8 barrels of fluid, 104.5 barrels of which was oil, and continued swabbing about 5 barrels of oil per hour. Production is from the Ellenburger, at approximately 8358-78 feet. Testing will continue.

Gaines County: Sun Oil Company's J. A. Sparks 1, wildcat in Sect. 396, Block G, CCSD&RGNG Survey, recovered drilling mud with some oil and gas, and 5 feet of clean oil on drill-stem test at 6445-520 feet in the Clear Fork. Test is bottomed at 6820 feet.

Honolulu Oil Corporation's Clear Fork test, White & Shelton 1, Sect. 404, Block G, CCSD&RGNG Survey recovered 240 barrels of oil and 13 barrels of water on a recent 24-hour swabbing test. Water was reported increasing as tests proceeded. Report is unofficial.

THE OIL MAN'S CALENDAR

SEPT. 17–19	National Petroleum Association Annual Meeting, Atlantic City, Traymore Hotel.
23–24	Fall Meeting, Petroleum Division AIME, Los Angeles, Elks Club.
29–30	Annual Meeting Independent Petroleum Association of America, Oklahoma City.
28 to Oct. 2	Regional Meeting, AIME (Includes 2-day Petroleum Division Session), Denver.
OCT. 6– 8	American Gas Association, Annual Meeting, Cleveland.
6– 8	ASME Petroleum Mechanical Engineering Conference, Houston.
8–10	Fall Meeting, Petroleum Division, AIME, Tulsa, Mayo Hotel.
10	California Natural Gasoline Association, Fall Meeting, Ambassador Hotel, Los Angeles.
13–15	Annual Meeting, American Association of Oil Well Drilling Contractors, Long Beach, Calif.
16–17	Texas Mid-Continent Oil & Gas Association, Annual Meeting, San Antonio, Gunter Hotel.
NOV. 10–13	American Petroleum Institute Annual Meeting, Chicago, Stevens Hotel.
DEC. 1– 5	ASME Annual Meeting, Chalfonte and Haddon Hall, Atlantic City, N. J.
1948 APRIL 21–23	National Petroleum Association, Hotel Cleveland, Cleveland.
MAY 15–22	International Petroleum Exposition, Tulsa.

Nomads Chapter monthly meetings: LOS ANGELES, second Wednesday, Jonathan Club. HOUSTON, second Monday, Ye Olde College Inn. NEW YORK, first Monday, Louis Sherry's. TULSA, third Wednesday, Hotel Tulsa.

• North Texas

Throckmorton, Grayson and Young Discoveries Finaled

Discoveries completed in Grayson, Young and Throckmorton counties; Kadane field extended east; Denton wildcat pumper and 2 weldcats in Jack County testing prior to completion.

Grayson County: Standard Oil Company and Texas' Covey-Bates 1, J. B. McAnair Survey, was completed as a discovery from a series of sand shows, probably in the Strawn series. Gauge was 89.5 barrels of 36.7-gravity oil daily through 12/64-inch choke, GOR 326/1. Total depth is 3794 feet. An offset is on location 2200 feet west of the discovery.

Denton County: The Texas Company's Dr. C. Saunders 1, J. Ayers Survey, is a small wildcat pumper. Latest gauge was 25 barrels of oil and 70 barrels of water through perforations from 2405-13 feet.

Archer County: G. E. Kadane & Sons' W. C. Frey C-2, Sect. 15, Palo Pinto CSL Survey, has extended the Kadane field east. The well flowed 80 barrels per hour through open casing after operators cleaned and drilled plug from 5½-inch casing set at 4289 feet. Total depth is 4318 feet.

Wilbarger County: Amerada Petroleum Corporation drilled out and completed Goodpasture 1, Sect. 35, Block 15, H&TC Survey, from deeper in the Ellenburger pay of the Fargo Ellenburger field. It was an Ellenburger discovery but was completed in the upper pay level. New productive level for the well is at 6295-6306 feet. It was making 171.5 barrels of 41.9-gravity oil, 30 percent water, per day through 18/64-inch choke.

Anderson-Prichard Oil Corporation's Ethel A. Bond 3, Sect. 35, Block 15, H&TC Survey, north of Fargo Ellenburger field, found a lime sand showing oil at 6127-38 feet. The section is above the Ellenburger and thought to be in the Simpson. A drill-stem test was being run.

Young County: R. C. Lipscomb's W. R. Foster 1, Sect. 342, TE&L Survey, 1½ miles west of the Padgitt-Mississippian field, logged lime showing oil at 4679-91 feet. A drill-stem test of the section recovered oil, and oil-cut mud. After acid treatment the well flowed 146 barrels of oil through 6/64-inch choke. It was completed officially for 112 barrels of oil per day through 6-64-inch.

Throckmorton County: Humble Oil & Refining Company completed Graham 4, Sect. 992, TE&L Survey, from the Mississippian lime, a new pay for the area. The well was flowing 543.8 barrels of 42.3-gravity oil in 7 hours, or 1765 barrels daily. Gas-oil ratio is 558/1. It was drilled to 4625 feet in lime, with the pay topped at 4607 feet.

Jack County: Continental Oil Company's J. Smith 1, wildcat in Sect. 2564, TE&L Survey, swabbed and bailed for 24 hours, recovering a little oil and no water. Test has been shut in. Total depth is 4900 feet.

A. R. Dillard ran a drill-stem test at Bass C-1, Riddle Survey A-1570, from 4740-55 feet, recovered gas in 2 minutes and a flow of oil in 15 minutes. No gauge was announced, but operator was preparing to set pipe.

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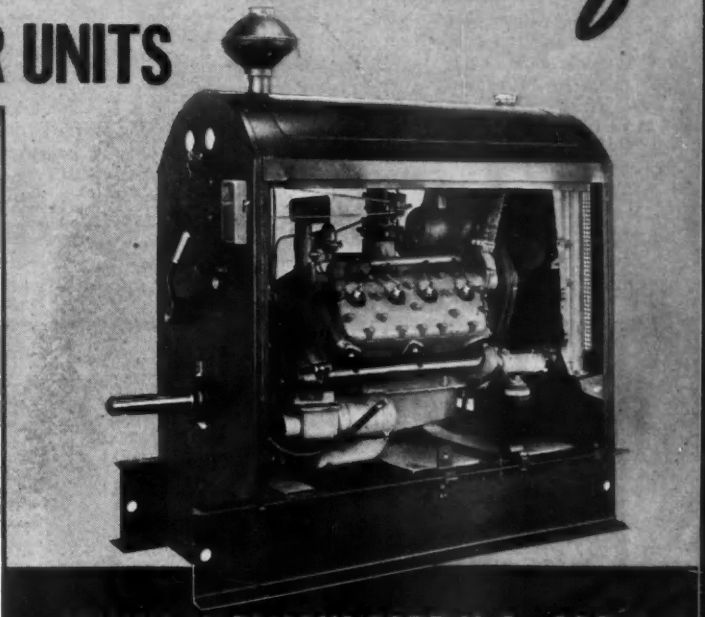

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20	.54	.90	.072	.12	.25	.38
25	.68	1.13	.09	15	.30	45
30	.82	1.36	108	.18	.34	.51
35	.95	1.58	126	.21	.39	.59
40	1.08	1.80	.144	.24	.44	.66
45	1.23	2.04	.162	.27	.49	.74
50	1.35	2.25	18	30	.54	.81
60	1.64	2.72	216	36	.63	.95
70	1.90	3.16	.252	.42	71	1.07
80	2.16	3.60	.288	.48	.88	1.32
90	2.46	4.08	.324	54	.98	1.48
100	2.70	4.50	360	60	1.08	1.62

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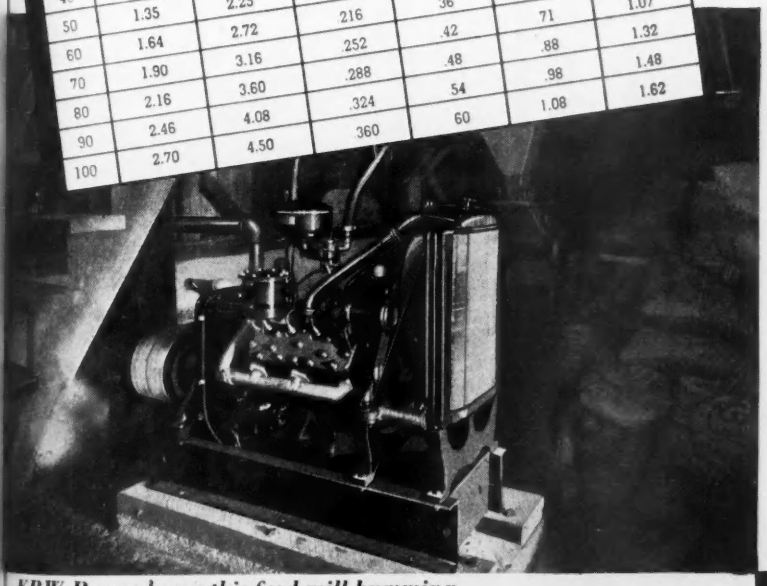

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• East Texas

Anderson, Hopkins Counties Discoveries Being Completed

Discoveries completing in Anderson and Hopkins counties; Chapel Hill gets Travis Peak pay; 2 possible gas discoveries in Harrison County.

Anderson County: Sanders & Murchison's L. W. Sides 1, I. P. Rinehart Survey, was completed and opened a Pettit oil pool 2 miles east of Blackfoot. On official test the well gauged 406 barrels of 44.1-gravity oil per day through ¼-inch choke with a gas-oil ratio of 562/1. Oil is from perforations at 9736½-40½ and 9750½-58½ feet. A south offset to the discovery will be drilled by The Texas Company, with location not announced. An east offset is expected to be drilled by Phillips Petroleum Company.

Sohio Petroleum Company was starting tests at Southern Pine Lumber Company 1, Jesse Gibson Survey. Drilling stopped at 6046 feet and 7-inch production casing was run to 5567 feet.

Hopkins County: Delta Drilling Company brought in new production at W. H. Coker 1, Nacogdoches University Survey, 4 miles southeast of Reilly Springs. Rig has been moved off to install pumping equipment. On test of perforations at 4119-210 feet, in what is apparently the Lower Eagleford, fluid rose to within 500 feet of the surface. The oil is of 20-25-gravity.

Smith County: The Chapel Hill field has a new Travis Peak pay zone. Chapel Hill Gas System's Bina Rayford 1, Thomas Payne Survey, completed for 101 barrels of 51-gravity oil and 987,500 cubic feet of gas per day through 13/32-inch choke from perforations at 8100-308 feet. Travis Peak was topped at 8070-80 feet. Operators are expected to request that the well be given an oil classification with daily allowable of 180 barrels.

Harrison County: Stanolind Oil & Gas Company's George Slaughter 1, J. E. White Survey, may open a Travis Peak gas field. Perforations at 6794-808 and 6816-24 feet were squeezed. Operators were preparing to perforate at 6798-808 feet. Shows in the Pettit also will be tested. The well was plugged back from 10,347 feet in the Cotton Valley.

Another possible gas discovery, E. C. Johnston's Edna Hood 1, Lucinda Wallace Survey, was shut down at 6566 feet in the Travis Peak. No gauge has been reported but gas production of 1 million cubic feet daily has been estimated. Production is from open hole below 6410 feet where 5½-inch pipe was set.

Shelby County: Humble Oil & Refining Company's Elzie Fleming et al 1, J. Hailey Survey, northeast outpost to the Pettit lime gas-distillate Huxley field, squeezed perforations at 5540-50 feet after testing 110 barrels of salt water.

Trinity County: Magnolia Petroleum Company's Bolton 1, Henry Bond Survey, confirmation test 5543 feet north and west of the discovery for Glendale field, gauged 31 million cubic feet of gas on open flow from 9932-42 and 9960-90 feet. The well tested 7 barrels of distillate, 3 barrels of water, and 1,730,000 cubic feet of gas through 7/32-inch choke.

California Natural Gasoline Group to Meet in October

With three out-of-state and two California men on the speaking program, the California Natural Gasoline Association's 1947 fall meeting will be held October 10 at the Ambassador Hotel, Los Angeles, Frank J. Colton, CNGA president, has announced. The speaking program has been arranged by the fall meeting committee, of which R. S. Ridgway, Standard Oil Company of California, is chairman. The evening dinner and show will be under the direction of the entertainment committee, headed by R. E. Raasch, OFCCO Construction Company. Plans also are being made for an all-day session of CNGA's Technical Committee on October 9, to which members of the Technical Committee of the Natural Gasoline Association of America will be invited.

The papers to be presented at the meeting are as follows:

"Adaptability of Centrifugal Compressors to Gasoline Plant Operations," by Dan McDonald, Magnolia Petroleum Company; "Motor Fuel Sensitivity," by E. J. McLaughlin, California Research Corporation; "Cycling at High Pressures vs. Depletion and Cycling at Low Pressures," by E. O. Bennett, consulting engineer; "Future Outlook for B. T. U.s in California," by Marion Dice, General Petroleum Corporation. C. L. Moore, El Paso Natural Gas Company, will give a general descriptive paper on that company's operations in connection with the delivering of natural gas to California.

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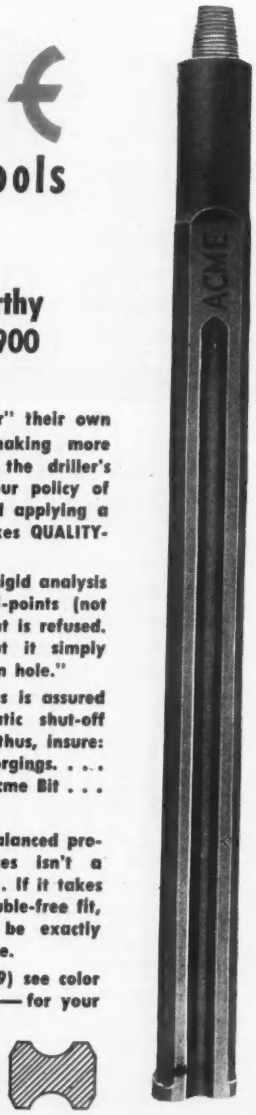

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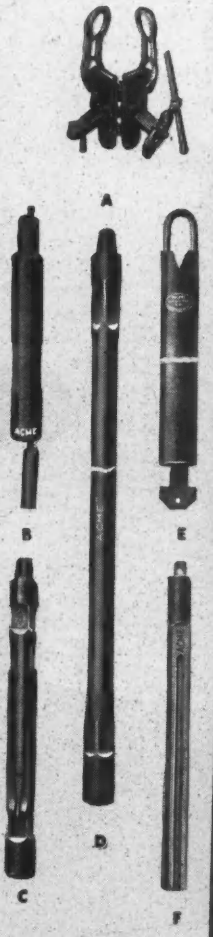

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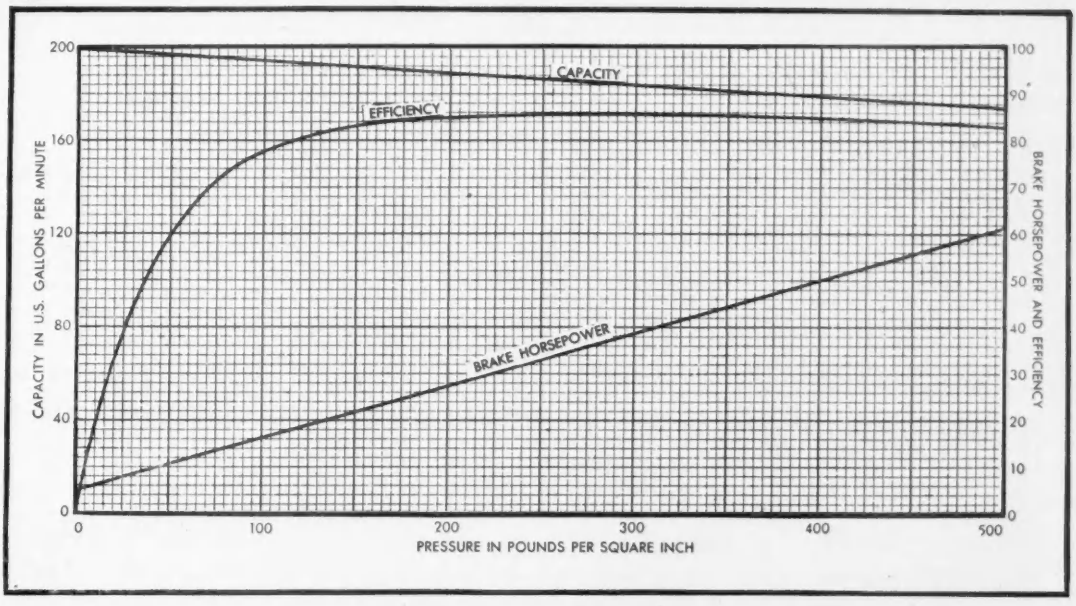

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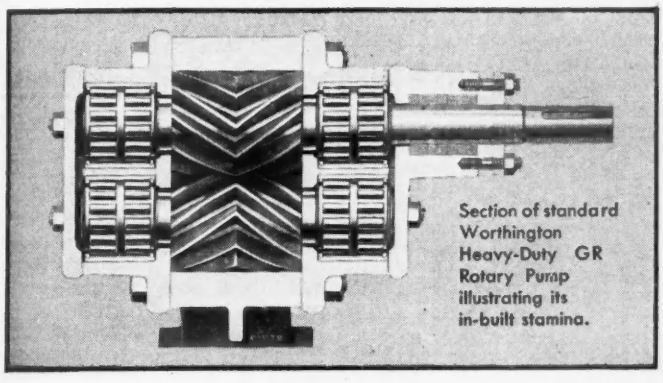

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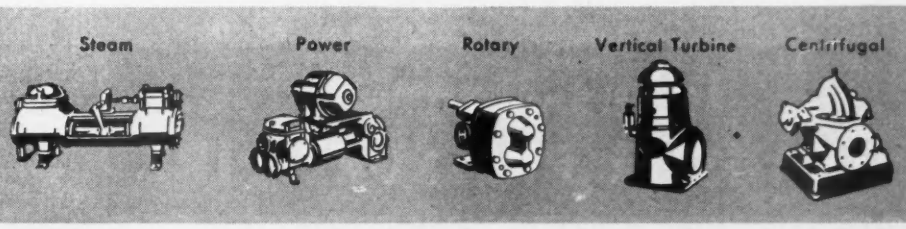

• South Central Texas

Atascosa County Wildcat Has Oil in Test of Edwards Lime

Atascosa County wildcat tests oil in Edwards lime; Charlotte field northeast extension area well makes initial production test; wildcat spotted 9 miles south of San Antonio; Frio County deep wildcat drills below 11,761 feet.

Atascosa County: Humble Oil & Refining Company has tested oil from Edwards lime at Nelle-Gordon-Dinsmoore 1, wildcat 5 miles east of Imogene field and 5 miles northwest of Muil field. On drill-stem tests at 8084-94, 8094-8104 and 8104-14 feet the well recovered small amounts of 33-gravity oil and at 8114-24 feet recovered salt water. Previously, gas and condensate were recovered on tests at 8003-8042 and 8067-81 feet.

In the northeast extension area at Charlotte field Humble Oil & Refining Company's Lujan 1-B has made initial production tests. The well flowed 48 barrels of oil daily through ⅛-inch choke with 600 pounds tubing pressure. Production is from open hole in the Edwards lime at 6990-7016 feet.

Bexar County: J. M. West has staked a 6000-foot wildcat 9 miles south of San Antonio. It will test the Trinity sands or deeper formations. The test is 660 feet east of the west line and 1280 feet north of the northerly south line of a 139½-acre tract in the Juan Manuel Urriegas Grant.

Frio County: Magnolia Petroleum Company's Wm. McKinley 1, wildcat 6½ miles northeast of Pearsall, is below 11,761 feet. This well topped the Edwards lime at 5605 feet and is projected to 12,000 feet.

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Petroleum Council Session Scheduled for October 9

Walter S. Hallanan, the Chairman of the National Petroleum Council, has called the next quarterly meeting of the Council to be held in Washington on October 9 at 9:30 a.m. in the Conference Room of the Secretary of the Interior.

It is expected that reports of committees of the Council dealing with various aspects of the petroleum situation, particularly with regard to problems which confront the industry in meeting military and government requirements, will be ready for consideration.

Use of Basing Point System Reportedly Being Probed

The Federal Trade Commission reportedly is investigating the use of the basing point system in the oil industry.

Specifically, the commission is said to be studying the use of Tulsa as a basing point, following complaints from oil companies. Involved are questions of collusion between companies, price discrimination and the degree of control exercised at Tulsa and its effect on competition.

The commission has long been engaged in a campaign against industries using basing point systems, and the Department of Justice also raised the question in its Mother Hubbard suit.

• Southwest Texas—Lower Coast

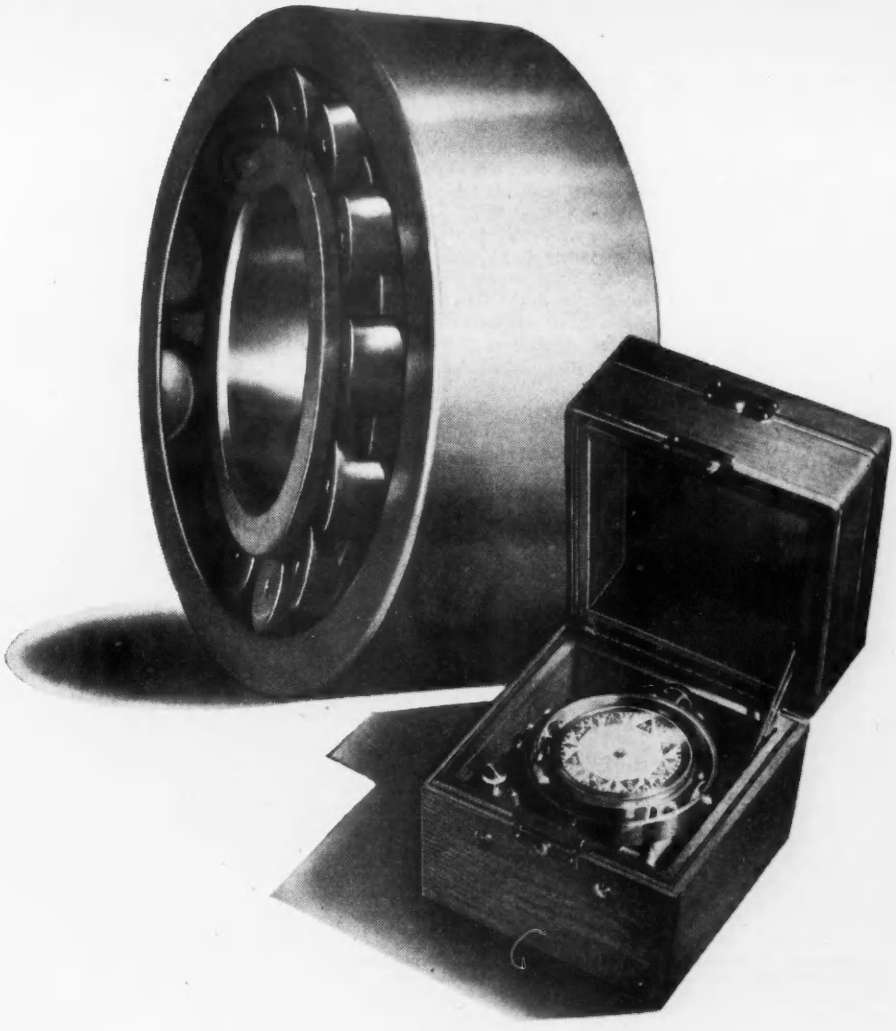
Second Producer Completed In New Fulton Beach Field

Second producer in Fulton Beach field completed; oil discovery in Starr County given potential; casing set in wildcat west of Seeligson field; Piedras Pintas Dome extension given potential.

Aransas County: Second producer to be completed in the new Fulton Beach field is W. H. Hunt Trust Estate et al's Spencer-Crane 2. On completion the well flowed 174 barrels of 44.5-gravity oil daily on 9/64-inch choke with gas-oil ratio 689/1, tubing pressure 800 pounds, and casing pressure 1210 pounds. Total depth is 8250 feet with 7-inch casing set to 7268 feet and perforated at 7168-80 feet for completion. This well is 1720 feet northwest of Hunt's Spencer-Crane 1 discovery.

Starr County: Jay Simmons' First National Bank of Mission 1, oil discovery 3 miles north of La Reforma field and 2½ miles southeast of Kelsey field, has been completed. The well gauged 130 barrels of 41.3-gravity oil daily on pump with no water in the flow. Total depth is 7500 feet with 5½-inch casing set to 6505 feet and perforated at 6112-17 feet for completion. This discovery had another sand which was tested. Perforations at 6421-27 feet flowed 47 barrels of oil daily on ⅛-inch choke with 1800 pounds working pressure and gas-oil ratio 11,430/1. Because of the high gas-oil ratio the operator did not attempt to dual-complete the well in this lower sand.

Jim Wells County: Casing has been set in Magnolia Petroleum Company's A. A. Seeligson 103, wildcat 2 miles west of Seeligson field and 1½ miles northwest of S. Haldeman field. Total depth is 6010 feet with 7-inch casing set to



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5900 feet. Drill-stem tests were made at 5375-82 feet where gas and condensate were tested, at 4408-14 feet where dry gas was tested and at 3792-97 feet where oil and salt water were tested.

Duval County: H. H. Howell's Magnolia Petroleum Company 1, extension on the northeast flank of Piedras Pintas Dome and a new pay discovery, has been given potential test. The well flowed 256 barrels of 48.2-gravity oil daily on 3/16-inch choke with tubing pressure 450 pounds, casing pressure 560 pounds, and gas-oil ratio 585/1. Total depth is 3598 feet with 5½-inch casing set to 3033 feet and perforated at 2845-64 feet for completion.

• Middle Texas Coast

Lolita Field North Flank Test Has Oil from New Pay Zone

Deep exploration on north flank of Lolita field tests oil from new deep pay zone; Albert West field outpost drilling ahead after testing oil in both Luling and Slick sands; Sunray completes new Goliad County discovery.

Jackson County: Magnolia Petroleum Company's Four-Way Ranch 14, deep exploration on the north flank of Lolita field, was testing oil from a new deep pay zone. On initial test the well flowed 3 barrels of oil hourly from perforations at 7566-74 feet. This well is 3000 feet southwest of Humble Oil & Refining Company's Four-Way Ranch 1-D, completed this year from a new deep pay zone at 7865-71 feet, making 88 barrels of oil daily on ⅛-inch choke with gas-oil ratio 8193/1. Total depth of the Four-Way Ranch 14 is 8300 feet with 5½-inch casing set to 8049 feet.

Live Oak County: Continental Oil Company's Albert West 2-B, outpost a mile northeast of Albert West field, is drilling below 6965 feet after making drill-stem tests in the Luling and Slick sands. A test at 6822-31 feet in the lower Slick sand developed 200 pounds working pressure in 11 minutes and recovered the 2000-foot water cushion and 5 feet of condensate and 200 feet of gas-cut mud, bottom hole pressure flowing being 2575 pounds. A test at 6939-43 feet in the Luling sand developed 3 pounds working pressure in 30 minutes and recovered 4018 feet of oil, 90 feet of oil-cut mud and salt water, and the 2000-foot water cushion,. Previously, at 6747-55 feet in the upper Slick sand, using ¼-inch chokes and 1500 feet of water cushion, the well developed 60 pounds working pressure in 30 minutes, recovered the cushion and 2780 feet of oil and 100 feet of salt water.

Goliad County: Sunray Oil Corporation's Brandt 1, field discovery 1½ miles northwest of Weser field, has been completed. Completion is in the Luling sand from perforations at 7715½-18½ feet. On initial gauge the well flowed 7 barrels of oil per hour on 9/64-inch choke with 1750 pounds tubing pressure and gas-oil ratio 2043/1. Perforations at 7440-55 feet in the Reklaw flowed gas and condensate on a drill-stem test and recovered 60 feet of condensate. Total depth is 8513 feet with 5½-inch casing set to 7770 feet.

• Upper Texas Coast

San Jacinto Field Is Given Long Northeast Extension

San Jacinto field extended 3000 feet northeast; northeast flank outpost at Fairbanks field makes production test; Altantic abandons wildcat in Security area of San Jacinto County.

Harris County: Houston Oil Company of Texas' A. J. Elkins et al 2 has extended production in the San Jacinto field more than 3000 feet northeast. On potential the well flowed 56 barrels of 61.9-gravity condensate and 2,022,000 cubic feet of gas daily through 12/64-inch choke. Flowing pressure on tubing was 2500 pounds and calculated open flow potential was 8½ million cubic feet of gas daily. Total depth is 8550 feet with 5½-inch casing set to 8514 feet and perforated at 8463-66 feet for completion. This well is in the John Iiams Survey.

Union Producing Company's W. W. Goodykoontz 1-A, outpost on the northeast flank of Fairbanks field, has made a production test of perforations at 7458½-59½ feet. The well flowed gas, condensate and salt water from these perforations and they have been squeezed in order that further tests may be made up the hole. Prior to setting casing a drill-stem test at 7178-250 feet flowed gas with 500 pounds working pressure. Total depth is 7468 feet with 7-inch casing set on bottom.

San Jacinto County: The Atlantic Refining Company has abandoned R. L. White 1, wildcat in the Security area located on a 37.6-acre lease in Mary Rucker Survey, A-259, 4 miles south of Mercy field production. Total depth is 10,506 feet with 5½-inch casing set to 8854 feet for production tests. Initial perforations were made at 8708-12 feet where salt water was tested. These perforations were squeezed and a new test made at the same level, which also showed salt water.

Oil Properties Sold

Oil-producing properties consisting of 550 acres, owned by American Liberty Oil Company, M. H. Marr and Adah Marr in the Burnell field, Karnes County, Texas, have been sold to Anderson-Prichard Oil Corporation. The acreage will be included in unitization of the field. Anderson-Prichard also plans to participate in construction of a cycling plant to cycle gas from Burnell and North Pettus fields in Karnes, Bee and Goliad counties. The plant is expected to cost about $6 million.

• South Louisiana

Oil Tested in Stanolind's Vermilion Parish Wildcat

Oil tested in Stanolind's Vermilion Parish wildcat; new perforations to be tested in Texas' East Cameron prospect; casing set in wildcat 1½ miles east of Jennings field; Four Isle Dome test drilling below 14,185 feet.

Vermilion Parish: Stanolind Oil & Gas Company has tested oil at E. M. Watkins 1, wildcat 6 miles east of Florence townsite in 23-13s-1w. A drill-stem test of perforations at 9278-82 feet, using 3000 feet of water cushion, flowed at the rate of 206 barrels of oil daily on a 13-hour test and then went to 90 percent salt water. These perforations have been squeezed in an attempt to cut out the

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water flow and another test will be made at the same level. Total depth is 12,191 feet with 7-inch casing set to 10,900 feet and 5-inch liner to 11,900 feet. Initial production tests were made from perforations at 11,310-26 feet, where the well developed 4300 pounds top pressure, but a flow test was not made because of split tubing and casing. Casing was repaired but the operator was unable to clean hole to bottom and a cement plug was set and perforations made above the 10,000-foot level.

Cameron Parish: Further production tests were being made in The Texas Company's Miami Corporation 4, wildcat on the East Cameron prospect in 13-14s-12w. From initial perforations at 5528-34 feet, the well flowed 169 barrels of fluid, 84 percent being salt water. These perforations have been squeezed and casing reperforated at 4592-96 feet for another production test. Total depth is 11,669 feet with 7-inch casing set to 5665 feet.

Acadia Parish: Casing has been set in Continental Oil Company's W. W. Duson 1, wildcat 1½ miles east of Jennings field in 18-9s-12w, and production tests are to be made. Total depth is 12,512 feet with 7-inch casing set to 10,665 feet. Gas sands were logged at 10,450-68 and 10,548-62 feet.

Terrebonne Parish: The Superior Oil Company is drilling below 14,185 feet at State-Unit 12-2, deep exploration at Four Isle Dome. Seven-inch protective casing has been set to 14,028 feet. Several deep sands were logged before setting casing and these will be tested if no other shows are encountered.

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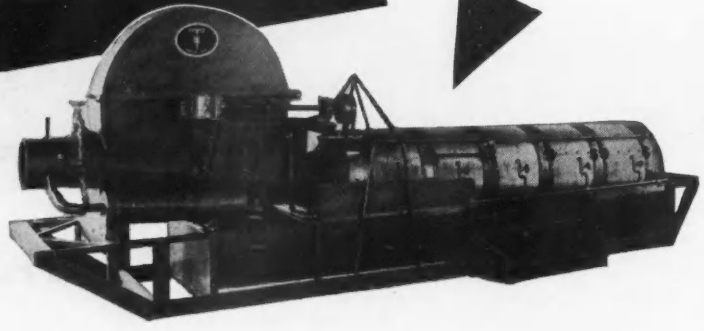

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• North Louisiana

Tuscaloosa Shallow Pay Being Opened in Bossier Parish

Tuscaloosa shallow field being opened in Bossier Parish, west of Lake Bistineau; Kickapoo Rodessa pay test to get rework job; Logansport deep test still drilling toward Cotton Valley; Ashland field Rodessa test plugs back.

Bossier Parish: M. A. Halsey's Harold Skidmore B-1, C SE SE 1-16n-11w, was reported to have discovered a Tuscaloosa shallow sand pool west of Lake Bistineau. After testing for several days the well was producing 40 barrels of oil and some salt water per day from 20 perforations at 2613-18 feet. Squeeze jobs were run to shut off formation water from above and below the Tuscaloosa pay. Total depth is 5837 feet. This is the second deep test for the area, H. C. Owens' Skidmore 1, C NE SE Sect 1, is being abandoned at 5365 feet without attempting to test the Tuscaloosa.

De Soto Parish: E. C. Laster was preparing a workover job to eliminate formation water in Alice D. Witherspoon 1, C SW SE NW 3-14n-14w, gas-distillate discovery in the Rodessa, a new pay for the Kickapoo field. Recent test revealed 10 barrels of estimated 58-gravity distillate and 10 barrels of formation water, accompanied by 2½ million cubic feet of gas.

Skelly Oil Company's Thelma Nash 1, SW NE 20-12n-16w, deep test on the north flank of the Logansport gas field, is drilling below 10,484 feet, still searching for the top of the Cotton Valley.

Natchitoches Parish: The California Company failed to find production in the Rodessa section of the Ashland field and plugged back Johnson et al 1, 1-13n-8w, from 5379 feet to complete from the Detro sand section, where a good pay was logged.

• Arkansas

Wesson Field Extension Try Swabs Water, Runs Squeeze

Prospective Wesson field extension swabs salt water and runs squeeze job; nominal oil shows found in Columbia County wildcat; Nevada wildcat tests oil.

Ouachita County: T. W. Lee and R. W. Burnett's E. H. Morgan 1, C NE SW SW 27-15s-19w, prospective 1½-mile extension to the Wesson field, swabbed salt water through perforations in the Hogg sand at 3068-105 feet, and was preparing to run a squeeze job. Operators believe it probable that water is channeling behind the casing and can be eliminated entirely. A total of 37 feet of sand showing oil was logged in the well at 3068-105 feet. Several other operators are interested in the area, three having staked location.

Columbia County: McAlester Fuel Company's W. M. Paschal 1, C SW SW 19-15s-20w, logged some shows of oil in the Pettit horizon at 3720-32 feet and continued drilling below 5700 feet toward the proposed goal of Smackover lime. No drill-stem test was made. The wildcat is in the Cottage Hill area.

Nevada County: Sohio Petroleum

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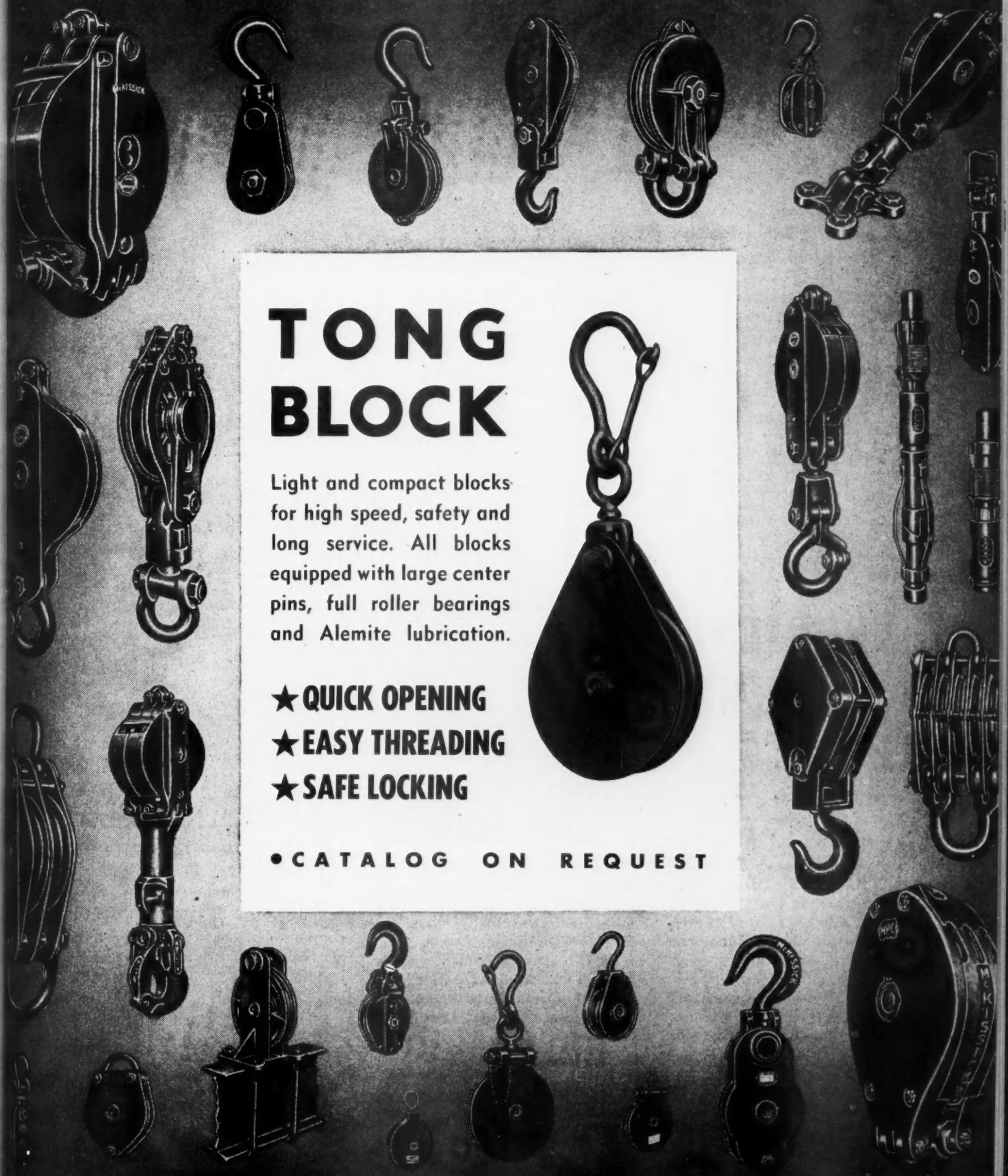

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BOX 2496

TULSA, OKLAHOMA

Company's Louis Pelt 1, C NW SW SW 19-15s-22w, wildcat near Falcon, is drilling below 3446 feet. Oil was recently recovered on a drill-stem test at 3106-11 feet, net recovery being 1710 feet of 27.7-gravity oil, with bottom-hole flowing pressure ranging from 495-610 pounds. Another core at 3111-16½ feet recovered 1½ feet of sand showing oil, which on drill-stem test made 5 stands of oil-cut water and 8 stands of salt water.

Lafayette County: Barnsdall Oil Company-Spartan Drilling Company's wildcat Bodcaw Oil Company 1, C SE SW 8-18s-23w, 2 miles south of the McKamie field, is drilling below 7190 feet, without shows. Travis Peak was topped at 4713 feet.

• Mississippi

Yazoo County Wildcat Finds Encouragement in Tuscaloosa

Yazoo County test gets encouragement; Jones County test at 13,167; Adams County flank test abandoned.

Yazoo County: J. R. Frankel's A. Eisner Estate 1, NW NW 24-11n-4w, 7500-foot test, has had good shows in the Tuscaloosa zone after previous encouragement in higher sections. Extensive cores were taken at 6712-6780 feet and rcovered sand with heavy oil stain. Cores at 7133-38 feet in the Comanchean zone yielded a thin section of asphaltic sand and white sand. The well is drilling below 7235 feet and will go to scheduled depth before undertaking to further develop the shows.

Jones County: Gulf Refining Company's L. L. Majors 1, SEc NE 29-6n-11w, which should make a producer, has reached total depth of 13,167 feet after coring 2 feet of salt immediately above that depth. Neutron log has been run and preparations were being made to continue on down. Union Sulphur Company's A. E. Fall Estate 1, NWc 8-9n-10w, wildcat, was trying to establish production with swab after getting fair shows from the Eutaw zone. Casing was perforated at 5412-20 feet and well was swabbed to recover mud and slight shows of oil. After resetting packer well was swabbed again with slight increases in oil.

Union's Earline Parker 1, NEc 31-10n-10w, wildcat, continued with tests after establishing production in the City Bank zone of the Eutaw. Casing was perforated at 5450-55 feet with 80 shots and the well pumped 10.8-gravity oil. After acidizing, tests were repeated on the pump and production was approximately 18 to 20 barrels of oil per day with no salt water present.

Adams County: Sohio Petroleum Company-Roeser & Pendelton's F. M. Baker F-1, NWc 34-6n-2w, which was drilled on the flanks of the LaGrange field, finally has been abandoned with no commercial shows. Sinclair Refining Company's Raphaael DeMarco 1, N&W SEc 14-6n-2w, LaGrange field, which is exploring depths below the present producing reservoir in the 6200-foot sands of the Wilcox zone, is working below 9087 feet with no shows reported from the lower horizons. The Wilcox zone was extensively tested but yielded no shows.

Lincoln County: C. H. Osmond's Grady Jordan 1, NW NE 29-6n-8e, potential extension attempt in the Mallalieu field, continued with tests. Well died after flowing for several days but production was reestablished and it pumped 85 barrels of oil in 10-hour interval.

Covington County: Humble Oil & Refining Company's Covington City Board of Supervisors 1, SWc 16-9n-17w, is drilling below 8250 feet with no shows reported. Cores from 8013-43 feet recovered shale and sand.

Hinds County: Continental Oil Company's H. R. Bryant 1, SE SE 9-5n-4w, is drilling below 8578 feet after cores at 7970-8083 feet recovered sandy shale and porous sand with no shows. Slight stain was noted in cores at 5656-5660 feet. Gulf's R. W. Trotter 1, NEc NW NE 15-7n-2w, was reaming out hole after reaching 4010 feet. After coring a few spots of brown oil from lime at 3842-47 feet, a drill-stem test was made at 3846-907 feet and recovered only mud and salt water with no shows.

Alabama

A. R. Temple's Smith Lumber Company 1, Nwc 26-8n-16e, Crenshaw County, which is running deeper than the usual state prospects, is drilling below 6232 feet. No shows have been reported.

Clarke County: Amerada Petroleum Corporation's Thomas 1, NW NE 30-7n-2e, is drilling below 4196 feet with no shows.

Fayette County: Amerada's D. H. Wright 1, NW SW 8-15s-10w, is drilling below 4430 feet. No shows have been developed.

Florida

Humble Oil & Refining Company's Gulf Coast Realty 11, NWc SW 20-48s-30e, in Collier County's Sunniland field, ran electrical log after reaching 11,573 feet. Operators were testing open hole after drilling plug at 11,550 feet.

Suwannee County: Sun Oil Company's J. H. Pillip's 1, SE SW 28-2s-15e, has been abandoned at total depth of 3571 feet. Drill-stem tests at 3329-571 feet recovered only mud, sand and salt water, while a test at 3136-304 feet had a slow blow with recovery of 60 feet of mud. No shows were reported.

• Michigan

Allegan County Wildcat May Be Discovery in Traverse

Allegan County wildcat shows for Traverse discovery; Newaygo County wildcat finds Traverse dry; fish recovered at Ogemaw County deep test.

Allegan County: Ford Oil Company's Bloom 1, SE NE NE 34-4n-13w, wildcat 4 miles north of Brenner-Monterey pool, was showing for a possible Traverse pool discovery at 1679-80 feet. The well swabbed and flowed 80 barrels of oil in 12 hours, cutting 15 barrels of water.

Newaygo County: Rex Oil & Gas Company's Blake 1, NE NE SW 32-16n-12w, Home township, closely-watched wildcat, drilled objective Traverse lime at 2618 feet and bottomed out dry at 2634 feet. Six other wildcats are active in the Newaygo area.

Ogemaw County: The Ohio Oil Company recovered fish at 5700 feet at Reinhardt 1, SE NW NW 35-22n-2e, projected 12,000-foot test in old West Branch field, and was drilling ahead.

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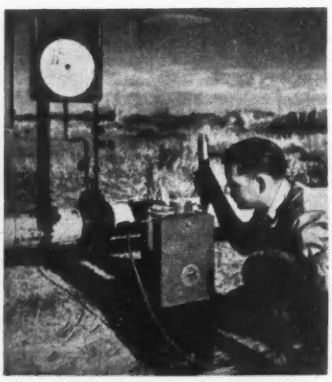

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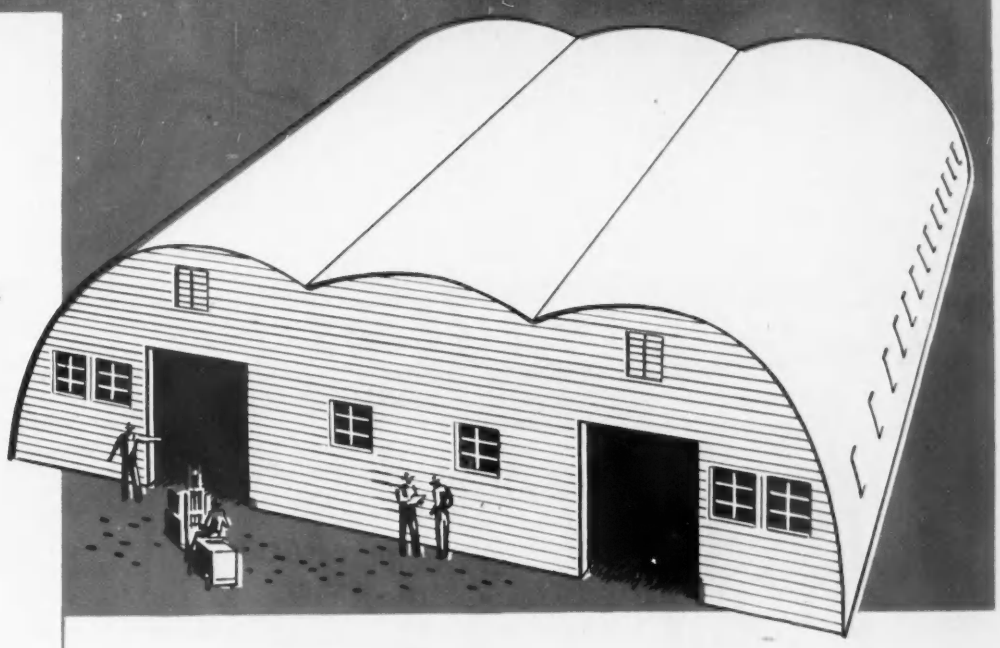

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• Illinois Basin

Webster County, Kentucky, Has Excellent Discovery

Webster County, Kentucky, has excellent discovery; Sohio opens oil area in Gallatin County, Illinois.

Kentucky

George Engle's Dixon 1, 2-L-24, Webster County, was rated among the state's top discoveries in recent months after flowing 335 barrels of oil in 24 hours from Tar Springs sand at 2552-80 feet. The No. 2 well in the area, a south offset, flowed 324 barrels of oil in 24 hours; No. 3 flowed 374 barrels of oil natural in 10 hours. Well No. 4, ¼ mile southeast of the discovery, cut 225 feet through a thrust fault encountered at 1200 feet.

Illinois

Sohio Petroleum Company's Logsdon 1, SE NE NW 5-9s-10e, Gallatin County, is opening a new area 1¼ miles southwest of the Ab Lake pool discovery. On a drill-stem test of Aux Vases at 2742-45 and 2755-63 feet, the well made 840 feet of gas, 540 feet of oil and 60 feet of oil-cut mud in 1½ hours.

Cumberland County: Joe Reznik is drilling below surface casing at C. A. Marshall 1, wildcat in NW NE SE 17-10n-8e, which is less than ½ miles from a wildcat drilled nearly 30 years ago and abandoned after conflicting reports as to oil shows.

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Fig. F533 Fig. F538

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(Fig. F533)

SPANG TRAP SOCKET
(Fig. F538)

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• Ohio

Price Hike Spurs Interest In Corning Grade Fields

Interest renewed in Corning field; Clinton sand again pays in Sayre pool; Irish Ridge pool extended east; first gas found in Rich Hill township.

Licking County: The recent increases in the price of Corning Grade crude have revived interest in the Corning Grade fields which have been inactive for several years. Two wells were completed southeast of Hanover in Hanover township. The Pure Oil Company's Edward Hickey 5, Lot 13, reported Clinton sand at 2857-96 feet and after shot made 129 barrels in 24 hours. Allen Willey's Edwin Randolph 1, SE SW 13, made 75 barrels the first day after shot, with Clinton sand at 2948-83 feet.

Perry County: On an inside location in the Sayre pool, Geo. W. Sharp et al's Jesse (John W.) Ketcham 3, SW SE 22 Bearfield township, came in at 2,700,000 cubic feet natural in the Clinton. Sand was logged at 3898-927 feet and finished at 3928 feet.

Muskingum County: John Morrow et al's Fred Mautz 1, SW SE 19 Brush Creek township, an east offset to his Seyerle 1, gauged 900,000 cubic feet in the Clinton sand when drilled in. The gas blew down to 500,000 cubic feet and the well was drilled to the Medina with a good showing of oil, which will be shot. Clinton sand came in at 4097-114 feet and the Medina at 4178-84 feet.

The first deep gas well to be completed in Rich Hill township was drilled in by Wasson Company at Harkness and Kingston NW SW 31. Clinton sand at 4620-52 feet gauged 1,300,000 cubic feet natural.

• California

Tidelands Oil Discovery Near Elwood Field Is Reported

Oil discovery reported on tidelands lease near Elwood field; 2 wildcats abandoned in Monterey County, another starts; 400-barrel flowing well completed in 56-year-old Bardsdale field; Huasna area of San Luis Obispo County to be prospected by Tulsa operator; Standard starts outpost at Santa Fe Springs.

Santa Barbara County: Signal Oil and Gas Company, Honolulu Oil Corporation, and Macco Corporation appear to have made an oil discovery near Coal Oil Point on a state tidelands lease about 2½ miles east of the Elwood field. Their joint test No. 1 on State Lease 309 began flowing through the drill pipe during the running of a formation tester. Output was estimated at between 150 and 200 barrels of approximately 31-gravity clean oil from the Sespe formation at about 4200 feet. After 12 hours, however, water broke in and the well died. Efforts to place it on production have not been successful to date. The Sespe is productive in the Capitan and Elwood fields along the Coast to the west, but is of minor importance compared with the Vaqueros, which is the principal producing horizon in both these fields. The Vaqueros is just above the Sespe and was dry in the well just drilled.

The new producing area 1½ miles southeast of the Orcutt field, discovered

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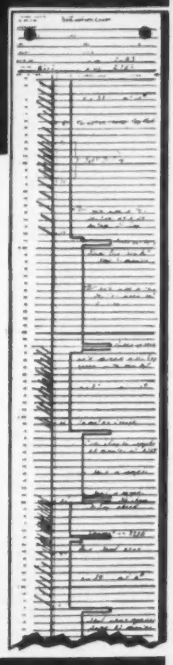

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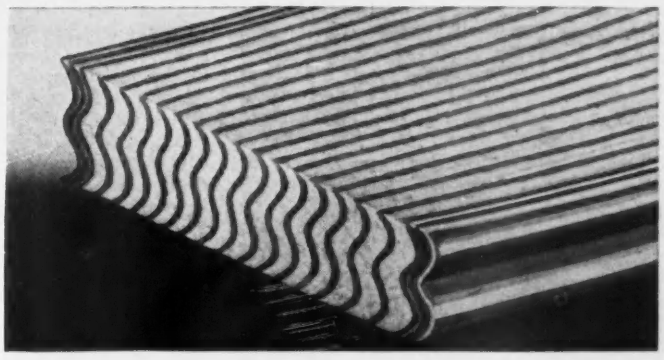

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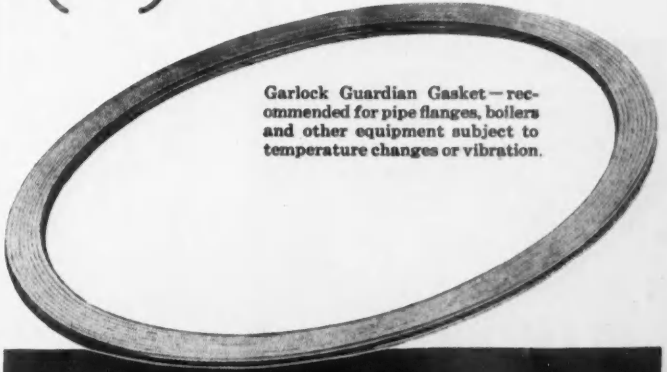

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PAGES 3945 THRU 3964 IN THE COMPOSITE CATALOG

recently by Sunray Oil Corporation, has been named the Four Deer field. Wells drilled to date are located in Four Deer Canyon. Successful completion of the company's Los Flores 1-A will establish the presence of 4 producing zones in the new field. This well was wet on a recent test, but should be completed as a pumper from a shallow zone at approximately 900 feet. Three other zones already proved are the Miocene-Pliocene contact, corresponding to the first zone in the Orcutt field, the Chert zone, corresponding to the main producing zone in the Orcutt field, and an entirely new horizon, found productive in the company's Los Flores 1 and not productive elsewhere.

Monterey County: The 2 active wild cats in the county were abandoned. Operations at Jergins Oil Company's San Ardo 23 in 35-22s-10e ceased when the well went into Granite at 2567 feet. The Texas Company abandoned Currel 2, its second try in the area 4 miles west of San Lucas, at 2424 feet. Equipment was being moved to the San Ardo area where Biaggi 1, 12-22s-9e, will be drilled.

Ventura County: William H. Geis brought in a 400-barrel flowing well in the 56-year-old Bardsdale field. Robertson 2 was finished in the Eocene at about 6520 feet with 6⅝-inch liner run from 3712 feet to near bottom. No gravity figure was available but Eocene production here usually averages about 31. Unusually high production rate is attributed to modern completion methods.

San Luis Obispo County: Danziger Oil & Refining Company of Tulsa has staked Twitchell 1, wildcat in the Huasna area, 34-32s-15e. Site is about ¼ mile from an unsuccessful test drilled in 1930 by Union Oil Company and abandoned at 4156 feet in the Cretaceous. Prospectors have been attracted to this area for almost 50 years by extensive oil seepages. About 40 wells have been drilled, ranging from 300 to 7200 feet deep. Although the results have not been particularly encouraging thus far, the wells that have been drilled to date cannot be said to have condemned the district as a whole.

Los Angeles County: Standard Oil Company of California, which has drilled several tests in the last 2 years in an endeavor to extend production around the Santa Fe Springs field, has made location for Houghton Community 1 on the west edge of the field on its Houghton lease, 36-2s-12w.

Orange County: Tide Water Associated Oil Company has foundation in for Blum Community 1, wildcat near Anaheim in 21-4s-10w. Shell Oil Company drilled an unsuccessful test ½ mile northeast to 6000 feet.

One mile northeast of the small Santa Ana Canyon field in 30-3s-8w, Fullerton Oil Company has located a wildcat, Dominguez 1.

Washington

Shell will start drilling operations on its first wildcat in the Pacific Northwest in a few days. The company recently acquired acreage in the Black Diamond area, about 10 miles north of Enumclaw. Properties have been leased from Pacific Coast Oil Company, Northern Pacific Railroad Company, and Northwest Improvement Company. Location for the first test, Pacific Coast Coal Company 1, has been made 330 feet south and 1400 feet west from the northeast corner of 14-21n-6e.

• Rocky Mountain Area

Seven Mile Dome, Wyoming, Wildcat Swabs Oil After Acid

Seven Mile Wyoming wildcat swabs oil after acid; second test made at Park County wildcat; Pure spot test on northeast side of Worland field; casing run at General Petroleum's Sand Creek prospect; Carter tests North Craig, Colorado, wildcat; oil shows found in Rio Blanco County flank test; Utah deep test may be abandoned.

Wyoming

The Seven Mile wildcat drilled by Phillips Petroleum Company and The California Company swabbed 195 barrels of oil in 24 hours after acid. Rig was being torn down prior to installing pump for completion.

This well, Christiana 1, NE NE SE 8 - 17n - 77w, Albany County, topped Muddy at 5820 feet and production was through perforations at 5818-33 feet, following acid washing with 800 gallons of kerosine and 500 gallons of mud acid. The well was drilled to Sundance but found water in all horizons except the Muddy. The well evidently crossed a fault in the lower sands, giving increased section over that found in Quealy Dome, 5 miles southeast. It was reported, but not confirmed, that another well will be drilled on the structure immediately, possibly to the Tensleep.

Park County: On a second test of the Frontier formation at Northern Pacific 53-33, NW SW NE 33-58n-100w, Sand Coulee, Seaboard Oil Company and Resolute Oil Corporation recovered 4 barrels of 43.4-gravity oil, 2 barrels of mud, and an estimated 75,000 cubic feet of gas in 2 hours. Bottom-hole pressure was 1000 pounds. The test was made at 5918-90 feet and operator was still testing. Frontier in the well was at 5500 feet.

Washakie County: The Pure Oil Company has located Unit 7, SW NW NW 17-48n-92w, Worland field, to give further definition on the northeast side of the field. The company's Unit 5, a mile southeast of production, was waiting on cement after running 5-inch liner from Frontier section to the top of the Embar. The well is at 10,184 feet, total depth, with top of Embar at 10,066 feet. Pure was still fishing at Unit 6, on the southwest side of the field. Embar was topped in this well at 10,260 feet, and the well is at 10,476 feet, total depth.

Casing has been run at General Petroleum Corporation's Sand Creek well and testing will be conducted on the probable Frontier sand discovery. The well is on a block in the southeastern section of the Big Horn Basin, 6 miles east of an Embar formation discovery made by the company early this year. Pipe was run to the top of the Third Frontier at 6685 feet and the operator was waiting on cement to set. On drill-stem test at 6692-738 feet this well made approximately 750,000 cubic feet of gas with 12 barrels of 45-gravity oil in 30 minutes. Additional saturation was cored and the well is now at 6753 feet, total depth. Production has been estimated at more than 450 barrels of oil daily, but no thorough tests of the Third Frontier have been made.

Colorado

The Carter Oil Company has made a drill-stem test at 7887-920 feet of the

North Craig wildcat after running casing to 7882 feet. The well is Unit 1, C SE SE 30-8n-90w, Moffat County, and with tester open 1½ hours only 660 feet of oil- and gas-cut mud was recovered. The zone between 7940-60 feet will be tested and if this does not show commercially, other sands up the hole may be tested before completion. This test made some oil in drill-stem tests below 7800 feet when the zone was drilled. The test was drilled to 9000 feet, total depth, prior to the present testing. Carter has an estimated 100,000 acres under lease in this area and additional tests may be drilled following completion of present testing on this well.

Rio Blanco County: Shows of oil have been encountered in General Petroleum's third attempt to find oil on the flank at Piceance Creek. The well, 24-12-G, SE SW NW 12-2s-96w, is at 3698 feet, total depth, and had oil shows at 3665-80 feet. Operator was preparing to drill-stem test this section. On test at 3518-41 feet the well made 150 feet of slightly gas-cut mud in 1½ hours. These sands are in the basal Green River section.

Utah

At Unit 1, C SE NE 24-14s-7e, Gordon Creek, Carbon County, Pacific Western Oil Company was drilling at 11,810 feet in the Coconino but the well soon may be abandoned. Top of Coconino is reported at 11,468 feet and cores at 11,748-800 feet showed some gas bubbles. Electrical log has been run to the Coconino and it is probable that some testing will be done on the well prior to abandonment.

Uinta County: Additional shows have been logged at Carter's Knudson 1, NW SW NE 18-5s-21e, on the Vernal Unit, and the well was reported drilling at 4500 feet. On drill-stem test at 4056-80 feet it made 240 feet of gas-cut mud in 30 minutes, and on test at 3714-3812 feet it made 40 feet of oil and 200 feet of oily mud in 2 hours.

Barbecue Planned

The annual barbecue of the Coalinga-Kettleman Chapter of API will be held September 20 at the Polvadero Country Club, Coalinga, Calif.

• Canada

British American to Intensify Western Canadian Exploration

British American Oil Company, Canada's No. 2 refiner and marketer of petroleum products, is expanding its Western Canadian oil exploratory efforts. It has acquired 6 Crown oil and gas reservations in Central and Northwest Alberta, totalling about 600,000 acres. About 200,000 acres are in geophysical reservation, in the Chip Lake-McLeod River area, about 75 miles west of Edmonton and northwest of the Leduc field. A seismograph party is starting on the block immediately. About 390,000 acres are in geological reservation in the Hines Creek area of northwest Alberta, sandwiched between Imperial Oil's Spirit River holdings on the south and Union of California's block on the north. A surface party is starting work shortly. The reservations are the first issued by the Alberta government since adoption of its new reservation regulations in July. A number of others are pending. Two 100,000 acre blocks (maximum per company at one time) have been acquired in B-A's own name, the other 4 in the names of 2 B-A employes.

B-A, a Canadian-owned company, has developed substantial production in the U. S. through its subsidiary, B-A Production Company. In Alberta, it has long had a substantial stake in Turner Valley production, but has limited its exploratory activities until this year. So far in 1947, B-A has shared in a successful Madison lime completion at South Princess, is now drilling the Central Leduc B-A-Pyrcz deep test at Leduc, and has started a Devonian test at Hand Hills (between Leduc and Princess) in association with an independent. The reservation acquisitions indicate a further broadening of its Alberta operations.

A new high price for oil rights on the Canadian Plains has been established at Leduc, with acquisition by the independent Atlantic Oils, Ltd., of 160 acres of "proven" rights for $200,000 cash, $1250 per acre. This sum has been paid the Rebus family, owner of mineral rights on the "freehold" quarter. In addition, Atlantic will pay Imperial Oil, Ltd.—which had a claim on the acreage—an unstated amount of oil out of a share of first production. The acreage is the northwest quarter of 23-50-26w4th, sandwiched between 2 pairs of Imperial producers, ⅜ mile from each pair. Atlantic will commence drilling on the quarter immediately.

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11 New Figure 1742 GASO 2½" to 5" x 10" Duplex Pumps with 4¼" x 10" Liners with CLIMAX R61 Engine, 6-Cylinder 6" x 7" Bore and Stroke, 160 HP at 1100 RPM. Spare parts and tools including extra set liners and valves. Perfect condition, export boxed, unit skid-mounted—$5,375.00 each, F. O. B. Granite City, Ill.

47 New Figure 1860 GASO 4½" x 6" Duplex Pumps, either 2¾" x 6" or 4½" x 6" Liners, with Chrysler C-36 8-cylinder 323.5 cu. in. displacement Engine. Spare parts and tools, perfect condition, skid-mounted unit—$1,550.00 each, F. O. B. Rockdale, Texas.

154 New BYRON JACKSON Figure 51 P. U. P. Units, 2 Stage 3" Centrifugal Pumps with CHRYSLER C-36 8-Cylinder Industrial Engine. Spare parts and tools. Export boxed, perfect condition. Weight—4060 lbs. $850.00 each, F. O. B. San Antonio, Texas.

127 New BARNES Model 7m 2" Self-Priming Centrifugal Pumps with WISCONSIN AB Engine rated 7000 GPH. New, export boxed. Weight—235 lbs. $157.50 each, F. O. B. Rockdale, Texas.

36 New GOULD Model 3490 4" x 6" Centrifugal Pumps, 1500 bbls. per hr. 120 lb. pressure with CONTINENTAL Model 33R 6-cylinder Engine 4½" x 5¼" Bore and Stroke. Skid-mounted, spare parts and tools. Export boxed—$1,625.00 each, F. O. B. Rockdale, Texas.

66 New 4" CARTER Self-Priming Pumps, Skid-mounted with CHRYSLER T-118 6-cylinder Engine. 350 GPM at 288' Head. Export boxed—$650.00 each, F. O. B. Rockdale, Texas.

18 New KOHLER 10 KW—120/240 volt AC Light Plants—Waukesha Engines. $885.00 each, F. O. B. Rockdale, Texas.

26 New 5 KW MASTER VIBRATOR-WISCONSIN 4-cylinder Engine 120 volt AC Light Plants—skid-mounted. $565.00 each, F. O. B. Rockdale, Texas.

81 25 KVA WESTINGHOUSE 120 volt AC Light Plants with LEROI D-382 Engine. Practically New Unit—$1,135.00 each, F. O. B. Baltimore, Maryland.

All above subject prior sale, change in price without notice, our confirmation. The above merchandise is not from others dealers' listings but our property. We have largest stock of Pumps in the United States.

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Attention: W. H. Orr
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3 Lucey 125 HP 325 WP, steam boilers. 17½ x 18 National slush pumps, feed pumps, crown block, oil well drilling engine, etc.

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FOR SALE

■ Light plants, war surplus, 110-AC, all sizes, for home or commercial use, ⅓ of original cost. Auffenberg, 820 No. Kingshighway, St. Louis, Mo.

■ For Sale—All or one-half royalty on 553½ acres. Jas. Buchanan Lease, Burleson County, Texas. C. H. Barnett, Caldwell, Texas.

One No. 7080-145 GKU Waukesha Engine IDECO Super Duty Service Unit complete with cathead. Unit practically new. Has skids with extra gasoline tank and can be used with gas, gasoline or butane. Call: The Cavins Corp., C-0439, Houston, Texas.

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■ Young Petroleum Engineer, Master's degree, speaks four languages, desires position after June, '48. Address: Box 105W, c/o World Oil, Houston, Texas.

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■ SEE A. L. BOWLES, ADA, OKLAHOMA, FOR SHALLOW DRILLING DEALS IN OKLAHOMA.

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■ FOREIGN POSITIONS: Junior Engineers, Material Men, Material Accountant, Payroll Clerks, Field Auditors, Warehouse Clerks, Geologists, Draftsmen, Male Stenographer-Clerks, Diesel Mechanics. These positions and many more are now opened for experienced applicants. Prefer single men. Fee paid by employer. Mail your resume to: CHAS. J. LOVELESS PERSONNEL SERVICE, 508 MAYO BUILDING, TULSA, OKLAHOMA.

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■ Wanted—For cash, rotary rig with 3500' capacity; prefer truck mounted, will consider others. W. R. Wilson, 3619 Forest Ave., Kansas City, Mo.

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19,278 acre Leon Ranch, 6 miles south Oakwood, Leon County, 140 miles northwest Houston, 120 miles southeast Dallas, available for exclusive hunting and fishing lease. Estimate 600-800 deer on place. Operated as cattle and hog ranch. Ample ranch roads and trails; oak and pine timber providing excellent cover. 68 acre lake is stocked with bass, trout and perch. Exclusive use of Lodge and Guest House with all modern conveniences, ample accommodations for 10 or 12 men included. 20 to 25 hunters is recommended maximum. Offered complete, subject prior negotiations, on exclusive lease for 1947 season, $2,500. Telephone or wire Lester Foran, 603 Nixon Building, Telephone 4367, Corpus Christi, Texas.

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■ Experienced graduate Petroleum Engineer by very substantial Houston Independent Operator. Require men who can supervise drilling and production operations. Should be experienced in well completion practices. Address: Box 104W, c/o World Oil, Houston, Texas.

Wanted

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A large, well-established Southwestern Manufacturer of oil well supplies, desires to make a connection in New York with an aggressive export agent that is capable and, also, willing to devote time and effort to the sale of their products. Give complete qualifications, firms you now represent, etc., in your first letter. All replies held in strict confidence. Address: Box 106W, c/o World Oil, Houston, Texas.

James E. Dyer, director and vice president of Sinclair Refining Company, has been put in charge of an expanded department which will supervise transportation and distribution. He also will head up a newly-established statistical department relating to company and industry operations. In 30 years with the company Dyer has held almost every post from warehouseman to district manager and general manager of sales. In the war period he was secretary of the National Committee on Transportation of the PIWC, Transportation Committee of PAW, District 1, and other related committees on tankers, tank cars, barges, pipe lines and transport trucks. **Ernest L. Hughes** has been elected a director and vice president in charge of sales for Sinclair Refining Company.

James E. Dyer

»

Philip C. Dixon, consulting petroleum and natural gas engineer, has moved his offices to the new City National Bank Building, Houston.

»

L. A. Bal has been transferred from Casper, Wyo., to Durango, Colo., as combination scout and landman for The Ohio Oil Company. **Stanley White** is district manager at Durango.

»

E. F. Feighl has retired after 20 years with Shell Oil Company as observer, surveyor, computer and draftsman. He has been in the Houston office since 1932.

»

Robert W. Harrison has resigned as chief engineer of Standard Oil Company of Texas to enter the consulting petroleum engineering business in association with **R. B. Mitchell.** The firm will be known as the R. B. Mitchell Company, with offices in the City National Bank Building, Houston.

»

John H. McKenzie has been named manager of the Safety Department for General Petroleum Corporation. McKenzie joined the firm in 1929 in the refining department and progressed through various positions in that and the engineering department. In 1934, he entered the company's fire prevention department and in 1942 was named fire and safety inspector at the company's Torrance refinery, the position he held at the time of his promotion to head all safety activities of the company.

»

J. Edwin Dunbar has been transferred from the Mississippi office of Magnolia Petroleum Company to the Dallas office, where he will work with **Howard Brooks,** chief scout. **Harry Smith,** Florida scout, will replace Dunbar. **Jim Munday** is the replacement for Smith.

Herbert D. Armstrong has been named assistant to the chairman of the board of Standard Oil Company of California. He has been assistant treasurer. Armstrong attended the University of California and Hastings College of Law, where he received his law degree in 1933. Following his admission to the bar, he joined the San Francisco law firm of Agnew and Boekel, where he served as assistant to the general counsel of the Federal Reserve Bank of San Francisco. In 1939 he became head of the discount and credit department of the Reserve bank and in 1942 was made head of the Evacuee Property department of the bank. Later he became assistant cashier.

Herbert D. Armstrong

»

Gordon Fisher, Gulf Oil Corporation, Fort Worth, will discuss "Practical Aspects of Reservoir Engineering" at the first technical meeting of the Oklahoma City Section, AIME, September 18.

Robert W. McIlvain, Jr., division manager of The Pure Oil Company's Rocky Mountain producing division, will move to Chicago as assistant to the vice president in charge of production. Since joining the company McIlvain has been in producing operations in company fields in Michigan, Texas, Illinois, Wyoming and California. **Worth M. Saxon,** manager of the Michigan producing division with headquarters at Saginaw, will replace McIlvain as head of the Rocky Mountain division. **Harvey J. Lowe,** manager of the company's Eastern producing division offices, also will assume the management of the Michigan division.

Robert W. McIlvain, Jr.

»

J. H. Osmer was named secretary of California Research Corporation, Standard Oil Company of California subsidiary, succeeding **O. S. Loud,** who will devote full time to expanded duties as coordinator of patents and infringements.

Deaths

W. R. Ramsey, Oklahoma City oil man, died in Los Angeles September 7. The head of Ramsey Oils, Inc., with holdings in Oklahoma and California, Ramsey was a native of Overbrook, in Oklahoma Indian Territory. He maintained an office at Oklahoma City, in the 33-story Apco Tower Building, formerly the Ramsey Tower, which he built several years ago.

»

Samuel C. Fisler, 80, Tulsa, retired lease broker, died September 7. He had lived in Tulsa 60 years.

Edward H. Short, Sr., 70, retired oil executive, died at Tulsa September 5. He moved to Tulsa in 1914 as vice president of the Margay Oil Company. He served with Warren Petroleum Corporation until he retired in 1944.

»

Thomas J. O'Reilly, 76, died September 5 at Brownsville, Texas. A veteran of 20 years in the oil fields of Mexico, he worked in various capacities with El Aguila Oil Company, Corona Oil Company and Huasteca Petroleum Company.

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Equipment Sales Appointments Made By Raybestos-Manhattan Company

Raybestos-Manhattan, Inc. has announced the following appointments in its Equipment Sales division: Harry C. Dishman, equipment sales manager with headquarters in Detroit; George T. Young, branch manager of the Detroit office; E. E. Juergens, branch manager of the Cleveland office; and John E. Cole, branch manager of the Chicago office.

Dishman started with Raybestos in 1916 as development engineer and factory superintendent. In 1919 he was appointed branch manager of The Raybestos Company's Detroit branch in charge of sales and engineering, and in 1932 he was named branch manager of the corporation Equipment Sales division, Detroit branch.

Young was formerly with the Cadillac Motor Company, and entered the sales department of The Manhattan Rubber Manufacturing Company in the Detroit office in 1917. He left for service in World War I and rejoined Manhattan in 1919. With the formation of Raybestos-Manhattan, Inc. he continued in the Equipment Sales division of the corporation at the Detroit office.

Juergens, previous to joining the Equipment Sales dvision in 1934 as eastern representative, spent 22 years in various phases of the iron and steel industry. During the past two years he has covered western New York, western Pennsylvania and Ohio.

Cole joined Raybestos-Manhattan in 1939 with the Industrial Sales division at the Cleveland office. During World War II he served with WPB in Washington and became acting deputy director.

Link-Belt Makes Sales Management Changes at Chicago and Minneapolis

Link-Belt Company has announced the following changes in sales management personnel:

James B. Elliott, heretofore divisional manager for Caldwell plant products, has been appointed divisional sales manager at the company's plant in Minneapolis. Elliott formerly served as district sales engineer for Minnesota, Wisconsin, and the upper peninsula of Michigan.

Erwin A. Wendell, heretofore district sales manager, Chicago branch, has been appointed divisional sales manager for Caldwell plant products, with headquarters at the Caldwell plant. Wendell entered the employ of the Link-Belt Pershing Road plant engineering department in 1918.

T. W. Matchett, heretofore district sales engineer at New York, has been appointed district sales manager, Chicago branch, with headquarters at the Pershing Road plant.

HOMCO Opens Office

Houston Oil Feld Material Company has established offices in Caracas, Venezuela, with D. U. (Doc) Skinner as reprepresentative. The company currently is servicing Creole Petroleum Corporation on its test in the Tucupita area, with cutting and fishing tools, directional drilling tools and other equipment.

Blaine Johnston, Jr.

E. F. Shiels

International Derrick Establishes Technical Service Department

A technical service department has been established at Dallas by International Derrick and Equipment Company, it was announced by G. W. Walton, vice president of the Machinery and Export Sales Division.

Walton believes his firm is the first manufacturer of drilling, servicing and producing equipment to provide technical service of this nature, for both domestic and foreign trade.

N. J. Herman

Members of the department are available for specific problems as well as group meetings of distributors and sales personnel.

Among members of the department are:

N. J. (Tiny) Herman, who has been in oil field engineering for ten years. He is assisted in designing and engineering the Triplex Slush Pump and the Clark-Ideco Power Rig.

Blaine Johnston, Jr., who spent ten years in the oil field equipment business in the Mid-Continent and California. He aided in the design and production of the Rambler Rig and Hydrair Hoist.

E. F. (Gene) Shiels, who aided in the design and production of power rigs at the Beaumont and Columbus plants and has been active in the Mid-Continent area.

Cooper Company Incorporates, Announces Personnel Changes

The Fred E. Cooper Company of Tulsa has been incorporated under the laws of the state of Oklahoma, and is now known as Fred E. Cooper, Inc.

Fred E. Cooper is president and treasurer; Harold E. Cooper, executive vice president, and Howard B. Appleton, secretary. Miss Margaret Megill, office manager, is assistant treasurer.

A number of changes have been made in the sales organization of the oil field supply corporation. B. R. Wiggins, formerly district sales engineer in the San Joaquin Valley of California, has been made Pacific Coast sales manager with headquarters at Los Angeles. Arthur D. Brunk will take his place.

The firm has been operating since 1918.

Hammond Official Leaves

Hammond Latino-Americana S. A., Wholly-owned subsidiary of Hammond Iron Works, Warren, Penn., and Port Neches, Texas, recently organized to field erect storage tanks throughout South America, announced that Raymound Sutton, general superintendent, has left for Venezuela to superintend the construction of storage tanks to hold 3 million barrels of Venezuelan oil.

...ONE OLD HEN IN THE BUNCH, THOUGH, WON'T SET ON ANYTHING!!
—YOU OUGHT TO TRY A LANE-WELLS PACKER... IT SETS SO EASY YOU THINK YOU'RE SETTING YOUR WATCH!!
GU
PERFO
LANE-WE
Tomorrow
ANY
oday!

SQUEAKS from the BULL WHEEL

Slow Going

"You should be ashamed — making passes at me after half a dozen drinks?"
"And why should I be ashamed?"
"For wasting those last five drinks."

Bare Facts

"Went to a nudists' party last night. Real swanky. Even had a butler to open the door."
"He naked, too?"
"Yep."
"Then how you know he was the butler?"
"Well, it wasn't the maid, son."

Core Drilling

Sam, the laziest man in the county, astounded his neighbors by buying a cow.
"Gosh, Sam," marveled a friend, "isn't it awful hard work milking that cow?"
"Not this cow. This cow is different. All you got to do is grab a-hold in the right places and she does all the work by jumping up and down."

He Had Grit

"So you complain about finding sand in your soup?"
"Yes, sir."
"Did you join the Army to serve your country or to complain about the soup?"
"I joined to serve my country—but not to eat it."

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Poet's Nook

Mary has a little swing.
It isn't hard to find;
Everywhere that Mary goes
The swing is right behind.

Encore

Bathing-suits are more and more
A little bit of less and less,
And on some girls I can't ignore
The fact that they're a great success.
But on the ones who deviate
From contours of perfection,
I am inclined to advocate
A trifle more protection!

Change of Appetite

The cannibal king looked at the beautiful young woman about to be tossed into the cooking pot.
"Humm. Believe I'll have breakfast in bed this morning."

Pardon It

Doctor: "May I kiss you?"
Nurse: "Certainly not. Do you think I want a doctor's bill pushed into my face?"

Biting Retort

A clergyman and a truck driver found themselves in an automobile smashup.
The truck driver told the padre what he thought about him in profane terms.
When he paused for breath it was the clergyman's turn. "You know, my good man, that I cannot indulge in your kind of language. But this much I will say: I hope when you get home tonight your mother will run out from under the porch and bite you."

Unto the Last

"If the president of the U. S. should die tonight, who would get the job?"
"A Democratic undertaker."

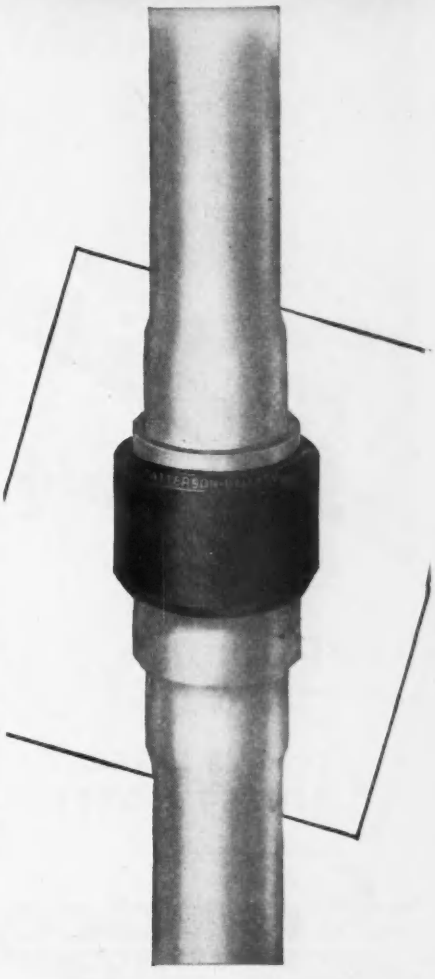
Ace in the Hole

"The stranger from Texas was a smart poker player," relates the old-timer, "but not quite good enough for these parts. I sets in a game one night with him and Greasy Dick an' Chocetoupe Shorty. They come a big pot with over $600 in it an' when it comes to a showdown Greasy Dick lays down a heart flush, ace high; Shorty shows four sixes with an' ace kickin' and the stranger holds four aces."
"Whew! And what did you hold?"
"Me? Oh, I was the coroner an' I held the inquest."

Woman Trouble

Arriving at a strange hotel, a fussy woman thought she'd better know where the fire escape was, so she started exploring. During her tour she opened a door and found herself in a bathroom occupied by an elderly gentleman.
"Oh, I'm sorry," she exclaimed, "I was looking for the fire escape."
Continuing her search, she presently heard the pad of bare feet behind her, and a shout made her turn. It was the elderly gentleman, clad in a bath towel.
"Wait a minute!" he gasped. "Where's the fire?"

"Best Bet Yet"



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DIXIE No. 1—2 swivels, ⅜ or ½" chain
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